Competent Person's Report, Berenice Cygnus Project

Report Prepared for:

Coal of Africa Limited & Peel Hunt LLP

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EXECUTIVE SUMMARY

This report replaces any previous resource reports for the Berenice Cygnus Project. Gemecs has been engaged by Coal of Africa Limited (the "Client") to update the Coal Resource Report for the Berenice project in accordance with the AIM rules and guidelines as set out by the AIM Note for Mining, Oil and Gas Companies. This report is addressed to the Client and its Nominated Adviser, Peel Hunt LLP. Gemecs understands that this report will be included as part of an AIM admission document to be published by the Client (the "Admission Document"). For the purposes of the AIM rules for Companies, Gemecs is responsible for this report as part of the Admission Document and declares that it has taken all reasonable care to ensure that the information contained in this report is, to the best of its knowledge, in accordance with the facts and contains no omission likely to affect its import. Gemecs consents to the inclusion of this report, and reference to any part of this report, in the Admission Document.

The Berenice project is currently owned by Universal Coal plc. The coal resources at the Berenice Coking Coal Project in the Soutpansberg Coalfield, South Africa, were re-evaluated in the light of results from an infill drilling programme conducted by Universal Coal during 2012. A total of 60 slim core boreholes and 16 large diameter boreholes were added to the project area, drilled mainly in the opencast 1 resource (Southern Open Cast Resource Area) block. The additional drill results improved the overall resource confidence and classification of the project, and provided additional large diameter analyses to more accurately quantify the expected coking coal product yields and qualities.

Gross in situ coal resources for the total project area is estimated at **1350.1 million tonnes**, with 424.9 million tonnes classified as Measured (32%), 800.9 million tonnes as Indicated (60%) and 124.3 million tonnes as Inferred (8%). Of this total, some 600Mt (+14.8Mt) (after geological losses) may be amenable to exploitation by opencast techniques. For underground areas a total of 503.3Mt (+35.7Mt) (after geological losses) is reported.

The gross in situ tonnes for the farm Cygnus only is estimated at **145.8 million tonnes**, and mineable in situ tonnes estimated at **119.7 million tonnes**. This is inclusive of the coal resources as reported for Berenice, and is only stated separately as it is covered by a separate prospecting licence and JV partner.

Net attributable tonnes based on the 50% interest held by Universal Coal Development II & V is stated at **675.1 million tonnes** gross in situ, and **551.8 million tonnes** mineable in situ.

A summary table of resources by status with net attributable tonnes is presented below in Table 1.

Table 1. Berenice Cygnus Project – Summary of coal resources by status

Summary of resources by status					
Coal	**Gross in situ tonnes**		**Mineable in situ tonnes**		
Category	**Gross in situ tonnes**	**Net Attributable**	**Mineable in situ tonnes**	**Net Attributable**	**Operator**
	Tonnes (Mt)	**Tonnes (Mt)**	**Tonnes (Mt)**	**Tonnes (Mt)**	
Measured	424.91	212.46	352.81	176.41	
Indicated	800.9	400.5	660.3	330.2	
Inferred	124.3	62.2	90.5	45.3	
Total	**1 350.1**	**675.1**	**1 103.6**	**551.8**	**Universal Coal Development II (Pty) Ltd**

*****Includes Cygnus GTIS of 145.8 million tonnes***

*****Includes Cygnus MTIS of 119.7 million tonnes***

The coal occurs within at least eight plies in three composite carbonaceous zones deposited within a structurally controlled half-graben structure, approximately 12.5km in length and 4km wide. The coal-rich zones have been intersected from sub-outcrop to up to 280m below surface and consist of interbedded bright coal and carbonaceous mudstones. Geological structure is anticipated as being relatively complex with a number of structurally defined coal-bearing 'blocks', as a result of a dipping coal seam, and faulting.

Average thickness for the coal plies range from 3.4m for the S2 ply, 1.3m for the S4 ply, 4.1m for the S6 ply, 3.5m for the S8 ply, 2.6m for the S9 ply, 1.9m for the S11 ply, 1.7m for the S12 ply, 2.9m for the S14 ply, 1.9m for the S15 ply and 4.7m for the S18 ply.

Analyses and detailed coal test work have confirmed that a primary soft coking product with a thermal secondary coal by-product can be obtained from the Berenice coal plies. The combined (primary coking coal plus secondary thermal coal) average theoretical coal yield obtained from the slim diameter drilling for the S02, S04, S06, S08, S09, S11, S12, S14 and S15 plies over the entire project area averages between 27% to 54%.

The results of analyses conducted on large diameter core samples from the Southern Open Cast Resource Area returned theoretical coking coal yields 40% higher than what is reported from the twin slim diameter core samples. The weighted average coking coal yield (at RD1.40) for all the coal plies combined, obtained from the large diameter drilling from this area is 18.8%, compared to 13.8% for the slim diameter drilling, with the S02L, S06L and S08 yielding 22.2%, 21.2% and 29.1% coking coal respectively.

Detailed analyses conducted on samples obtained during the 2011 and 2012 large diameter drilling programmes indicate that the Berenice coking coal could be classed as a medium ash (9.5%-10.5%), medium rank C, high vitrinite (82-85%) soft coking coal (according to ISO 11760: 2005 Classification of Coal by Rank) with high volatile content (+34% vols.), good caking properties (FSI (5-9), Roga (77-92), Grey King (G8-G11)) and high Fluidity (± 20,000ddpm).

Wash simulations indicate that the coal plies can yield 28.5% (weighted average over all plies at RD1.80) thermal coal as a secondary product with a calorific value of 22.3 MJ/kg (ad basis) and a volatile matter content of 28.6%. Higher quality thermal coal can be produced as a by-product but at lower yields.

1. QUALIFICATIONS OF CONSULTANT

Gemecs (Pty) Ltd ("Gemecs") is a medium-sized geological company which renders geological and mining consulting services to the mining industry. Its consultants have the required experience in preparing competent persons', technical advisors' and evaluation reports for mining and exploration companies.

Input is provided in terms of the JORC (Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, 2012 Edition) and supported by the Australian Guidelines for Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves, 2003 Edition.

Independence is assured by the fact that, neither the Competent Person, nor any of the Competent Person's directors, staff and associates involved in this report, hold any interest in the value of the "Client" or its subsidiary or associated companies, and do not have any interest in Universal and are independent of either Company's directors, senior management and advisers. Gemecs will receive a fee for the preparation of this report in accordance with normal professional consulting practice. This fee is not contingent on Admission or the outcome of this report and Gemecs receive no other benefit for the preparation of this report.

The information in this report that relates to Coal Resources for the Berenice Cygnus Project is based on a resource estimate completed by Mr Nico Denner who is employed by Gemecs (Pty) Ltd. Mr Denner, Pr.Sci.Nat, B.Sc Hons (Geology), FGSSA, SEG, is a geologist with 20 years' experience in the South African mining industry and sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr Denner is a Member of South African Council for Natural Scientific Professions (Membership No. 400060/98) and consents to the inclusion of this information in the form and context in which it appears in this report. The author states that this report complies with the guidelines as stipulated in the JORC code, 2012 Edition and coal resources are reported in accordance with the JORC code.

Gemecs places reliance on Universal Coal plc that all legal information provided to Gemecs at the time of writing is both valid and accurate for the purpose of compiling this report, including tenure and Mineral Right status.

2. INTRODUCTION

During 2012, Gemecs was commissioned by Universal Coal to manage the second phase infill drilling programme and to compile an updated coal resource report on coal deposits underlying the farms Berenice 548MS, Celine 547MS, Cygnus 543MS, Doorvaardt 355MS, Longford 354MS and Matsuri 358MS collectively called the Berenice Cygnus project, in the Soutpansberg Coalfield, Limpopo, South Africa.

Gemecs has reviewed, processed, evaluated and summarised the available geological borehole data pertaining to the property in terms of the recently completed exploratory drilling programme and has estimated the potentially available coal resources for the project. The available borehole data for this property was modelled, using the Geovia Minex^{TM} software by NJ Denner of Gemecs, to produce geological models, coal distribution maps and reporting of in situ coal resources. TJ Fox, an associate member of Gemecs, provided independent technical guidance and verification of drilling, logging and sampling procedures and standards.

3. PROPERTY DESCRIPTIONS AND MINERAL RIGHTS

3.1 Location

The project is located in the Limpopo Province of South Africa, some 120km to the North of Polokwane and to the east-southeast of the settlement of Alldays. The project may be reached via an all-weather gravel road which branches off from the tar road between Alldays and Waterpoort. The project area is approximately 50km by road from Alldays and about 30km by road from Waterpoort. The nearest sizeable town is Makhado (Louis Trichardt) some 80km by road to the south-east. The nearest accessible railway siding is at Waterpoort, approximately 30km south-east.

The location of the property in relation to the settlements and infrastructure is illustrated overleaf in Figure 1.

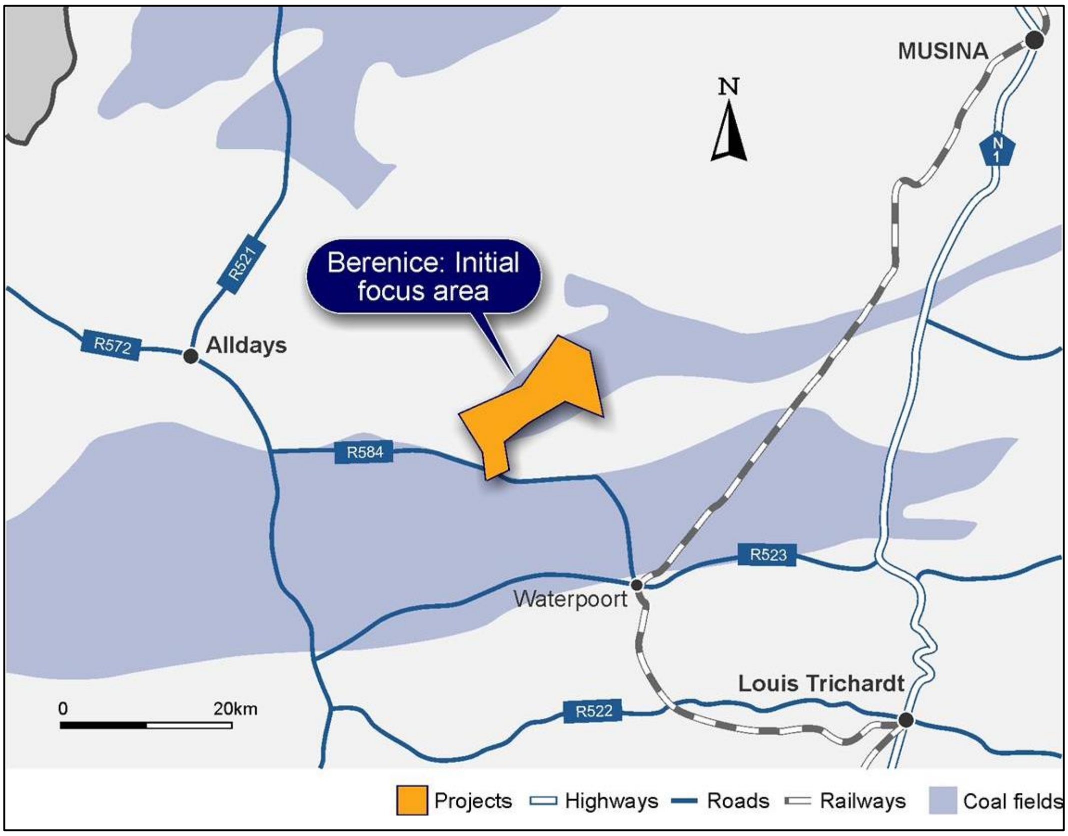

Figure 1: Location of the Berenice project in relation to Alldays and Waterpoort

3.2 Climate

3.2.1 Regional

The climate of the Limpopo Basin varies spatially from being arid in the west through semi-arid and temperate areas in central zones to semi-arid in the east, with a few sub-humid pockets in the centre. Three wind systems have a strong influence on the basin's climate.

Air temperatures across the basin show a marked seasonal cycle, with the highest temperatures recorded during the early summer months and lowest temperatures during the cool, dry winter months. Rainfall is also highly seasonal, falling predominantly as intense convective thunderstorms during the warmer summer months.

The severe droughts observed during the early 1990s and the exceptional floods during 2000 in the Limpopo valley illustrate the extreme variability of rainfall and runoff in the basin. This variation has significant effects on aquifer recharge.

3.2.2 Alldays

The area receives one cycle of rainfall that extends from October of the previous year and ends in March of the following year (approximately 182 days). The dry season runs from April to October.

Alldays normally receives about 292mm of rain per year, peaking during January and February, with most rainfall occurring during the summer. It receives the lowest rainfall (0mm) in June and the highest (65mm) in December.

The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Alldays range from 22°C in June to 30.4°C in January. The region is the coldest during July when the mercury drops to 5°C on average during the night.

Wind affects large areas of croplands in semi-arid areas of the Soutpansberg. The prime example is the Muswodi area where climatic factors such as rainfall, ambient humidity and drought are associated with it. The area experiences wind erosion during dry months. The erosion is intense in August.

3.3 Vegetation

3.3.1 Regional

The site is situated in the Mopane Bioregion in the Savanna Biome as defined by Mucina & Rutherford (2006). The site falls within the Musina Mopane Bushveld.

The Musina Mopane Bushveld is characterised by undulating plains and some hills from around Baines Drift and Alldays in the west, remaining north of the Soutpansberg and south of the Limpopo River. The altitude ranges between 300m in the eastern Limpopo Valley and 800 m.

The Musina Mopane Bushveld is seen as least threatened but is the most diverse mopaneveld type in South Africa. Only a small portion (2%) of the vegetation unit has been conserved in statutory reserves (Mapungubwe National Park, Boabab Tree Reserve and the Nwanedi and Honnet Nature Reserves). Roughly 3% of the vegetation unit has been transformed, mainly by cultivation. Erosion in the vegetation unit is high to moderate.

3.4 Fauna

3.4.1 Regional

The Soutpansberg has a remarkable diversity of mammals making up 60% of the total number of species that occur in South Africa. There are more mammal species in the Soutpansberg than in the Cape Floristic Kingdom (127). The whole of the Kruger National Park only contains two more species of mammals than the Soutpansberg. It is particularly rich in bats, carnivores and larger hoofed animals. The black rhino has been exterminated from the Soutpansberg as well as the Lichtenstein hartebeest and roan. Elephant, wild dog and lion only remain in the far eastern part within the Kruger National Park. Elephant do occasionally move to the northern foothills from the Limpopo region. Cheetah is not found on the mountain plateau any more but it is still amazingly common on the plains north of the mountain. Springhare is still relatively common in areas with suitable habitat.

3.4.2 Local

Locally, the area of interest is used as commercial game and hunting farms, as well as commercial cattle grazing.

3.5 Mineral and Surface Rights

The project area is held under two new order prospecting rights (Figure 2). Universal Coal plc entered into joint ventures with the BEE companies, Bono Lithi Investment Group (Pty) Ltd and Solar Spectrum Trading 365 (Pty) Ltd., which were granted the prospecting rights. The Universal Coal Development II (Pty) Ltd joint venture incorporates the prospecting right LP30/5/1/1/2/376PR and Universal Coal Development V (Pty) Ltd joint venture incorporates right LP30/5/1/1/2/1276PR. Refer to Table 2 below for details of each right. Berenice Project is 50.0% owned by Universal Coal Development II (Pty) Ltd, and Cygnus Project is 50.0% owned by Universal Coal Development V (Pty) Ltd both a subsidiary of Universal Coal. In addition, an application for a mining right was lodged by Universal Coal Development II (Pty) Ltd in December 2015, covering the Bono Lihi properties only. The mining right application exclude the Cygnus farm.

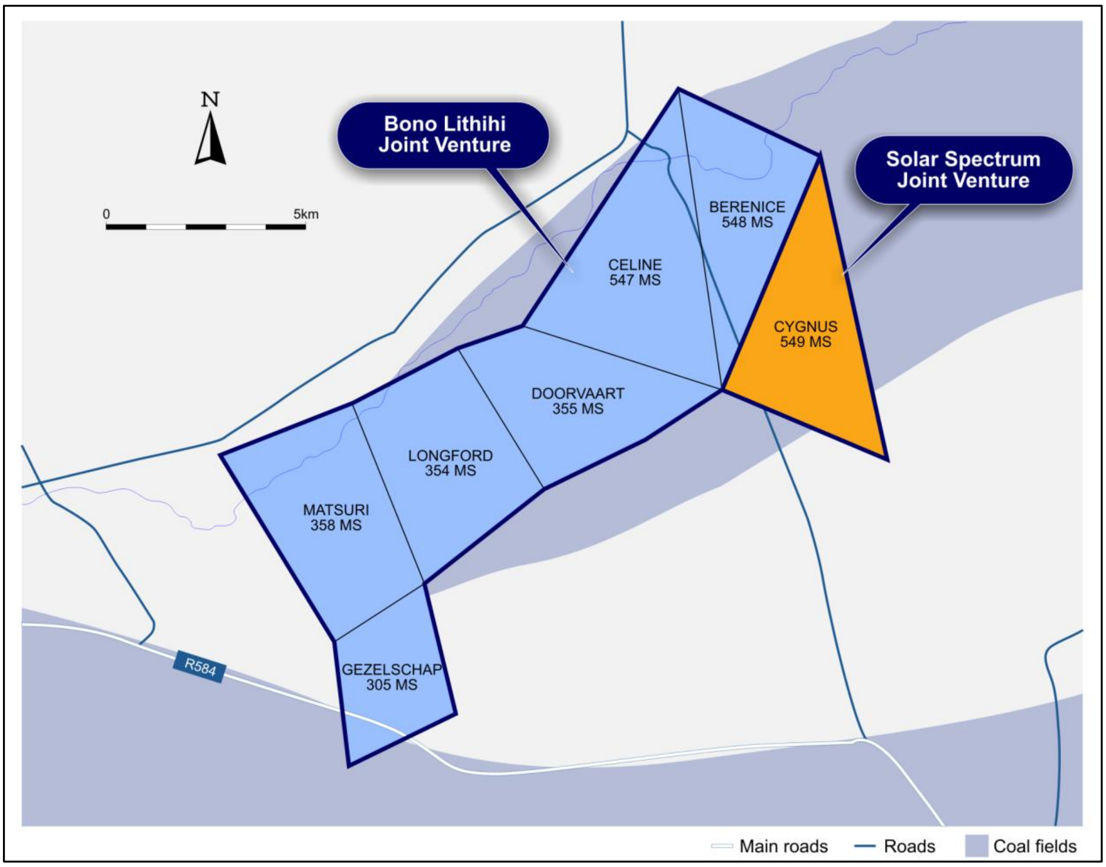

Figure 2: JV areas in partnership with BEE companies

Table 2: Details of the prospecting rights comprising the Berenice Cygnus project

Joint Venture Companies	Farms	Mine Title Registration Number	Permit Number	Interest (%)	Licence Expiry Date	Renewal granted	Total Size (ha)
Universal Coal Development II	Berenice(several farms)	342/2009 PR	LP30/5/1/1/2/376PR	50%	19/03/2016	Yes 20/03/2013	39,484
Universal Coal Development V	Cygnus (several farms)	227/2008 PR	LP30/5/1/1/2/1276PR	50%	06/05/2013	Application submitted 25/02/2013	12,299

Both the two prospecting rights include a number of other properties not included or reported on in this report. These other properties falls outside the coal bearing area of the Berenice project, and is therefore not included in this report. The Somerville properties (part of LP30/5/1/1/2/376PR) that do have any coal potential, is described in the Somerville Competent Person's Report.

Universal Coal has entered into access agreements with the surface right owners over the relevant farms within the Berenice Cygnus project area. A listing of surface rights is presented in Table 3 below. In terms of surface holdings, most of the properties are private game farms with seasonal hunting taking place.

Table 3: Details of the properties comprising the Berenice Cygnus project

FARM NAME AND NUMBER	SIZE OF PROPERTY (Ha)	SURFACE OWNER	ACCESS AGREEMENTS
Berenice 548MS	1 165.64	Z. Smit	Yes
Cygnus 549MS	1 311.17	P.S. Le Roux	Yes
Celine 547MS	1 681.66	Matsuri Eiendomme (Pty) Ltd	Yes
Doorvaardt 355MS	1 252.29		
Matsuri 358MS	1 466.64		
Longford 354MS	1 391.25		
Gezelschap 395MS	803.62		No (no coal)

The project area is located in an area which is relatively flat lying with the incision of the Brak River valley towards the north of the area, at a surface elevation of 690-735m above sea-level. An extract from the topographic map of the area showing the outline of the project area, as well as a "Google-Earth" image of the project area appears below (Figures 3 & 4). he location of the Berenice Cygnus project, with reference to the holdings of Coal of Africa assets and in terms of geology, is indicated overleaf in Figure 5.

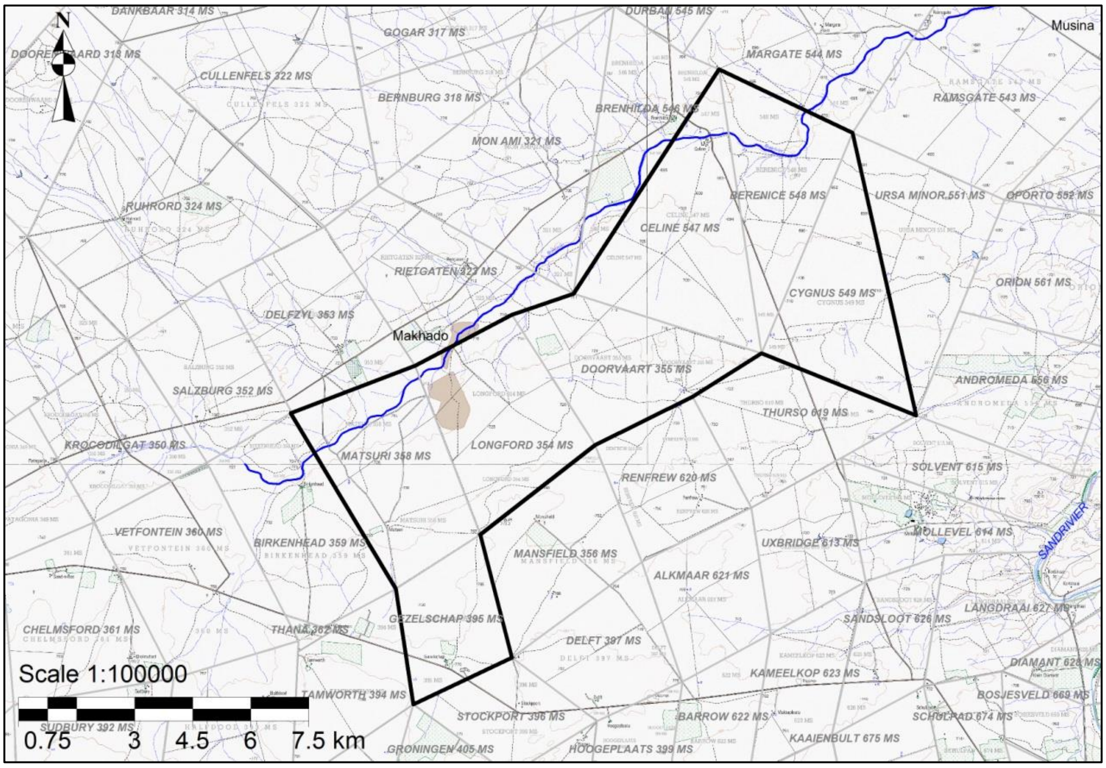

Figure 3: Topographic map showing the location of the Berenice Cygnus project and farms

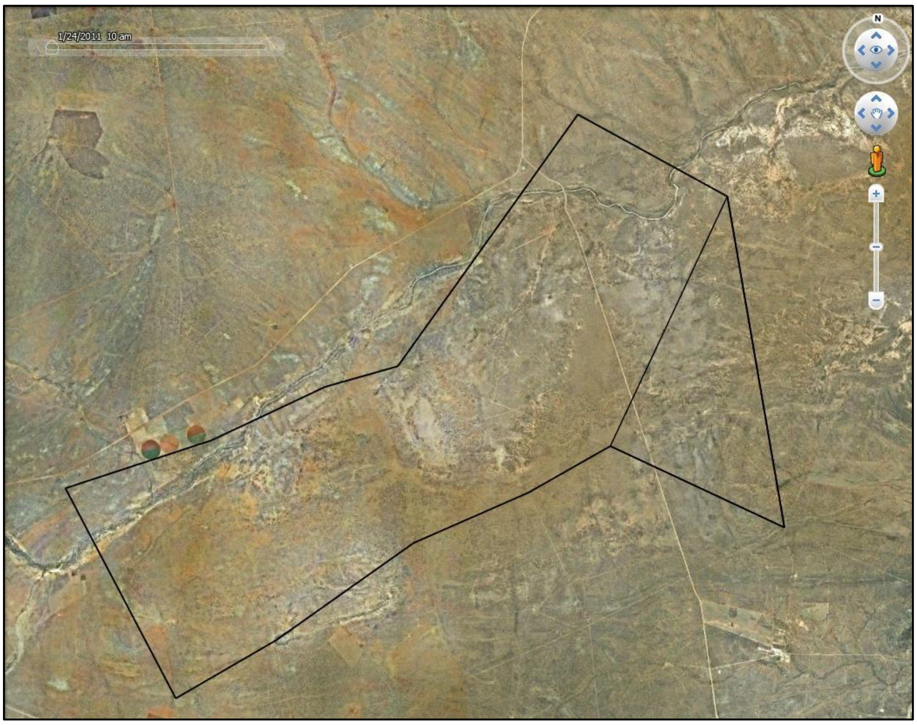

Figure 4: Aerial photographic (Google Earth) image of the Berenice Cygnus project area

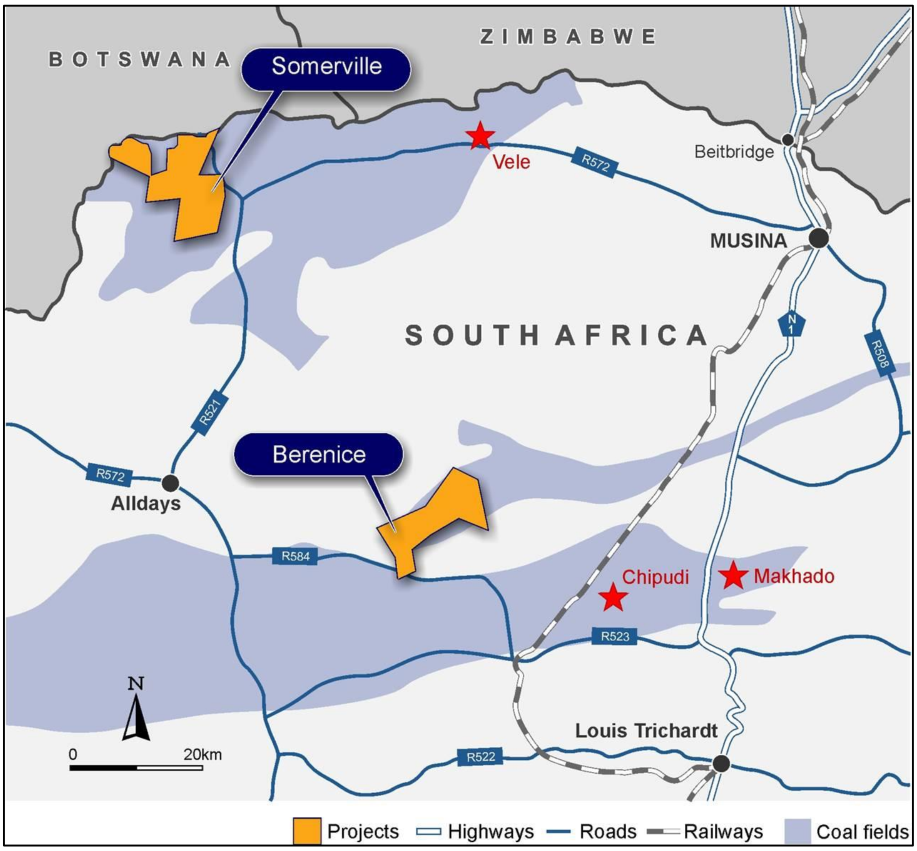

Figure 5: Map showing the location of Berenice Cygnus project in terms of surrounding coal project areas

4. GEOLOGICAL SETTING

4.1 Regional Geology

The Soutpansberg Coalfield is situated north of the Soutpansberg Mountain Range along the north-eastern edge of the Kaapvaal Craton. Coal-bearing strata are inconsistently developed within this area with the coal occurrences being typically bright coal/carbonaceous mudstone associations, forming composite coal 'zones'.

The greater Soutpansberg Coal Province, comprising the Soutpansberg and Venda-Pafuri Coalfields, may be divided into a number of sectors, as follows (Figure 6):

- Mabelebele Sector (South West)
- Mabelebele/Mopane Sector (Central)
- Tuli Sector (North)
- Pafuri Sector (North East)

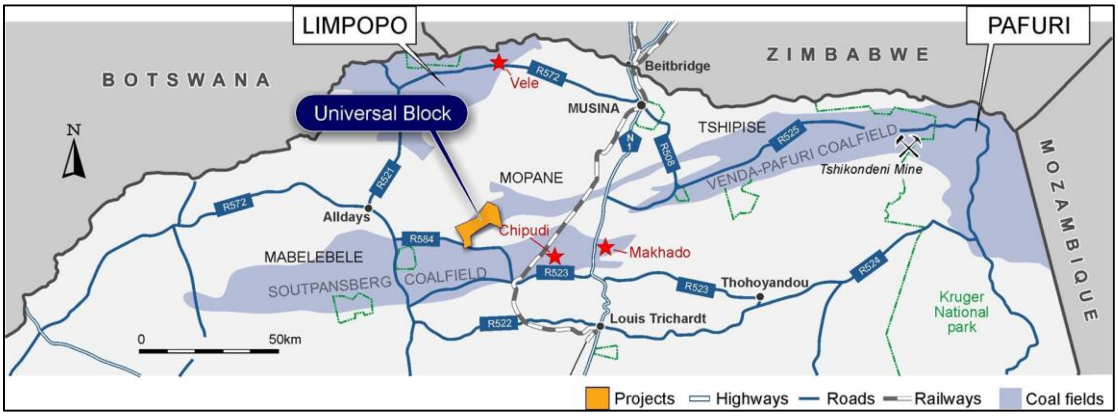

Figure 6: Showing the various sectors of the Soutpansberg/Venda-Pafuri coal fields

This coalfield is characterised by intensive faulting. Dislocations both parallel to strike and at a high angle thereto are common and sub-divide the coalfield into numerous irregular-sized blocks. Displacements vary between 20m and 200m. Syn-depositional faulting has to some degree controlled the size of individual coal "blocks" and has affected coal distribution significantly. The result is the tendency for coal quality and thickness to vary markedly from place to place, due to varying local depositional environments.

The thickest coal zone in this region is to be found some distance to the east of Waterpoort, comprising up to nine composite seams separated by carbonaceous mudstone, over a stratigraphic interval of about 40m.

A progressive rank increase eastwards across the coalfield is indicated.

The coal zones in this area are developed within the Ecca Group in strata which may be broadly correlated to the Mikambeni and Madzaringwe Formations from the type area near Makhado towards the south-east (refer to Figure 6). The Mikambeni and Madzaringwe Formations are the local representatives of the Vryheid and Volksrust Formations of the Main Karoo basin. These formations consist principally of fine-grained sediments such as siltstone, mudstone and shale and a number of zones/seams of coal.

The first major sandstone package in the sequence is that of the Fripp Formation which unconformably overlies the Ecca Mudstones and which generally forms a useful stratigraphic marker. The Fripp standstone tends to be laterally persistent and typically is around 30m thick. Since this sandstone package is fairly resistant to erosion it may be found as outcrop where present as the sub-surface rock unit. Above the Fripp Formation the Solitude Formation of the Beaufort Group occurs in the deeper areas and comprises mostly siltstone and red mudstone/shale.

The Ecca Group strata are underlain by varying thicknesses of the Tshidzi Formation (Dwyka Group) comprising a glacial sequence of tillites, diamictites, etc., representing the encroachment of the Karoo Supergroup over the pre-Karoo basement.

The Karoo Sequence rocks in the Soutpansberg Coalfield overlie Limpopo Mobile Belt and Soutpansberg-age rocks and dip at 2°-20° northwards, terminating against east-west trending strike faults forming the northern margins of the coalfield.

Regionally the nature of the coal deposits ranges from, in the west, multi-seam coal-mudstone associations (coal zones), some 40m thick, with seven discrete Coal Zones (ie. Mabelebele Sector & Waterpoort area), to 2 separate seams in the east (Pafuri Sector, Tshikondeni area), where an upper seam some 3m thick and a lower seam about 2m thick occur separated by approximately 100m of sediments.

Where developed, the coal component of the seams/zones is generally high in vitrinite content and the coal rank (carbon/energy content) steadily increases towards the east as well as to a more limited extent with depth. The Soutpansberg coal deposits are classified as a 'thick interbedded coal seam'-type deposit [SAMREC Code (2007) and SANS10320:2004].

4.2 Local Geology

The Berenice Cygnus project is located north-west of Waterpoort, within the so-called "B"-block of the Mopane sector of the Soutpansberg coalfield. Here the coal-bearing strata are deposited in a half-graben within the basement (Limpopo Mobile Belt) bedrock, fault-bounded toward the north-west and sub-outcropping towards the south-east. The Karoo sediments continue in a thin "strip" towards the east, running south of Mopane and eventually into the Tshipise area. The locality of the Berenice Cygnus property, superimposed on the regional geological map, appears in the following illustration (Figure 7).

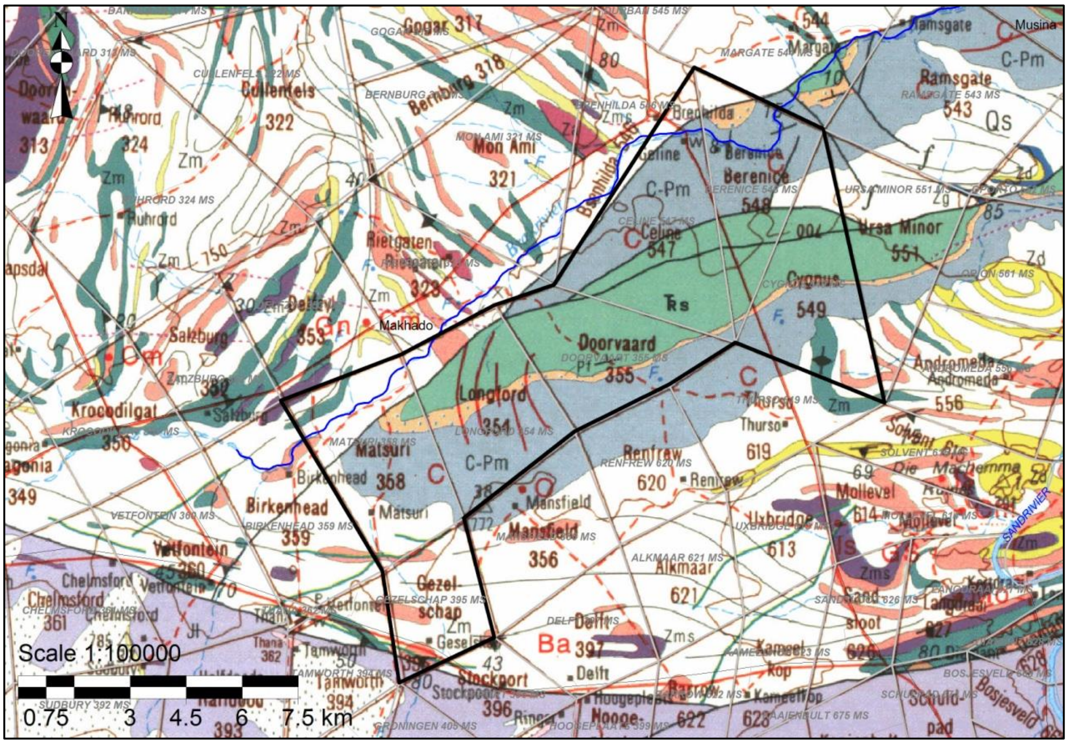

Figure 7: Published geological map extract showing the location of the Berenice Cygnus project area

The full Karoo Sequence is present in the Berenice Cygnus area with the coal-rich Ecca Formation underlain by tillites and diamictites of the Tshidzi Formation (Dwyka Group) and overlain by the sandstone package of the Fripp Formations. In the deeper parts of the basin the Fripp Formation is overlain by siltstones and red mudstone/shales of the Beaufort Group.

A schematic generalised stratigraphic column for the Berenice Cygnus area appears in the following illustration (Figure 8).

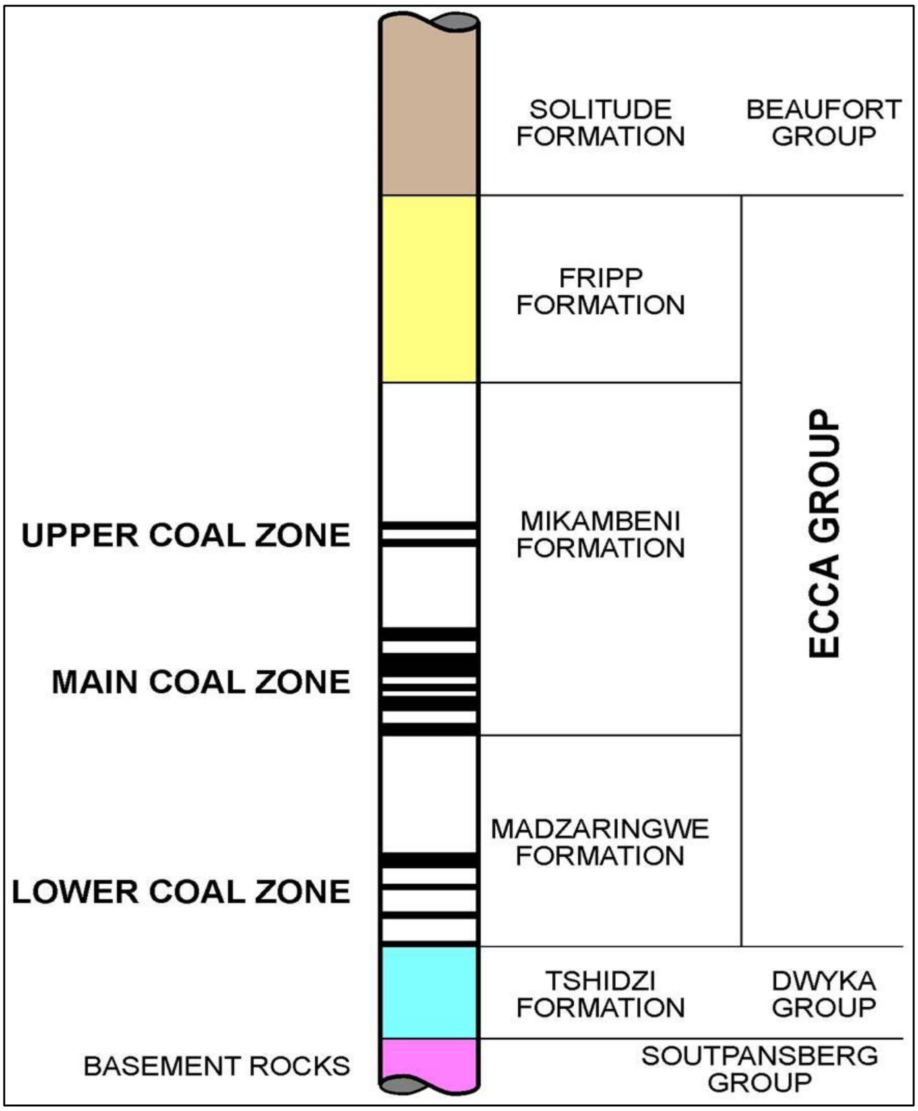

Figure 8: Schematic generalised stratigraphic column for the Berenice Cygnus project area

4.2.1 Coal Zones

The coal deposits of this locality consist typically of bright coal/carbonaceous mudstone associations, forming a series of composite coal 'zones'. Three coal zones can be identified and are named from top to bottom:

- Upper Coal Zone
- Main Coal Zone
- Lower Coal Zone

Correlation of the various coal-bearing zones, sub-zones and "plies" for the recently drilled boreholes has been undertaken to establish a level of correlation across the coal deposit. The Upper and Main Coal Zones display a relatively high degree of correlatability of zones, sub-zones and "plies" across the area, while the Lower Coal

Zone tends to exhibit a marked degree of variability and hence is not so readily correlatable from borehole to borehole.

Geological interpretation suggests that, since the prominent orientation of the basin is roughly east-west, syn-depositional fault movements are likely to have resulted in basement "highs", with the Lower Coal Zone preferentially deposited within elongate sub-basins with highly varying deposition environments. In contrast, partially due to the smoothing effect of earlier Lower Coal Zone sedimentation but also due to the inferred more stable tectonic conditions which are thought to have applied from the time of the deposition of the Main Coal Zone, depositional conditions and therefore the composition of the Main and Upper Coal Zones tend to be more uniform across the entire area.

The Upper and Main Coal Zones consist mostly of interlaminated to inter-bedded mudstone, coal and shale, while the Lower Zone, where developed, tends to be formed of a number of relatively thin coal beds or seams separated by non-carbonaceous or carbonaceous partings. The Main Coal zone, where preserved from weathering and erosion, is persistently well-developed and contains a number of sub-zones comprising "plies" with a significant proportion of bright coal. The Upper Coal Zone appears to be more variable in terms of thickness and is seemingly absent in some localities. In general this zone comprises between two and five sub-zones or "plies". The upper portion of this zone generally contains a slightly greater proportion of coal to the lower section and in some areas "shaling-out" of plies is indicated. The Lower Coal Zone appears to be only significantly developed towards the west of the exploration area (farms Longford and Matsuri) and is seemingly absent in general in the east (Cygnus & Berenice farms).

In order to process the data for this project the coal zones were split into a number of "coal plies"(S) representing the main coal sub-zone units and intra-zone "partings"(P) (units with a low coal content).

The "plies" are designated as follows:

- UPPER COAL ZONE: S01 (S01A/S01B).
- MAIN COAL ZONE: S02, P03, S04, P05, S06, P07, S08, S09, P10, S11, P11, S12, P13, S14, S15, S16.
- LOWER COAL ZONE: S18.

A typical profile showing the various zones appears below (Figure 9).

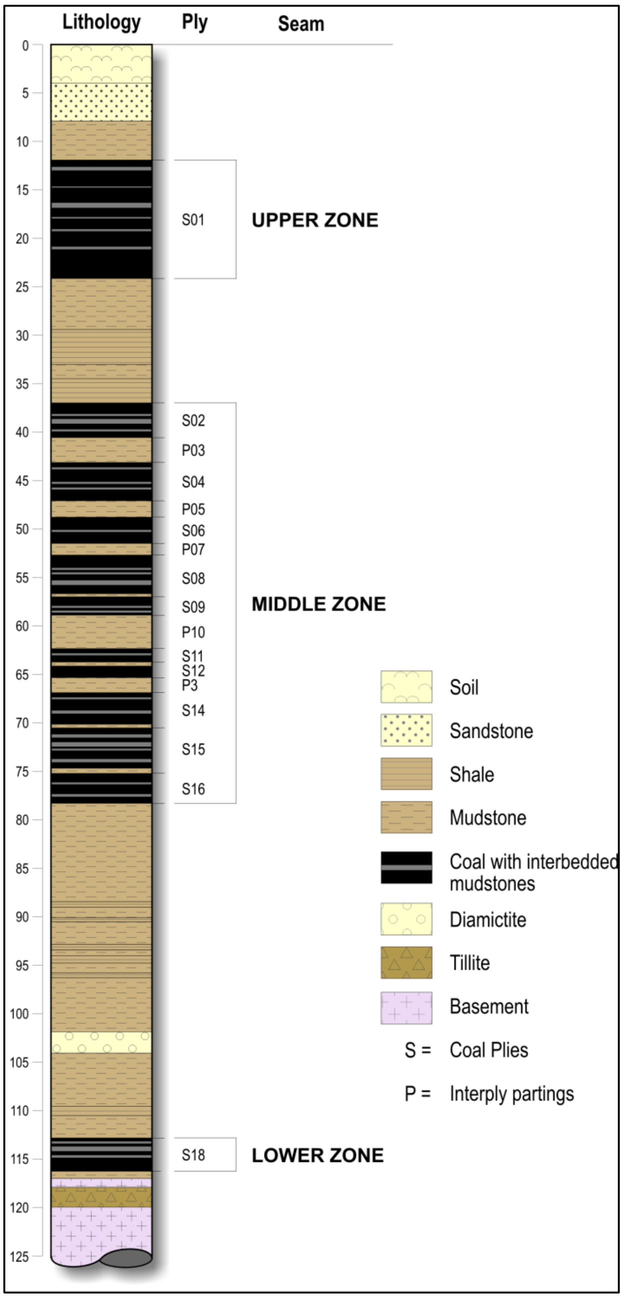

Figure 9: Typical profile showing the coal zones in the Berenice Cygnus project area

A detailed profile of the Middle Coal Zone, showing the various coal plies and partings, is presented below in Figure 10, followed by detailed descriptions of each.

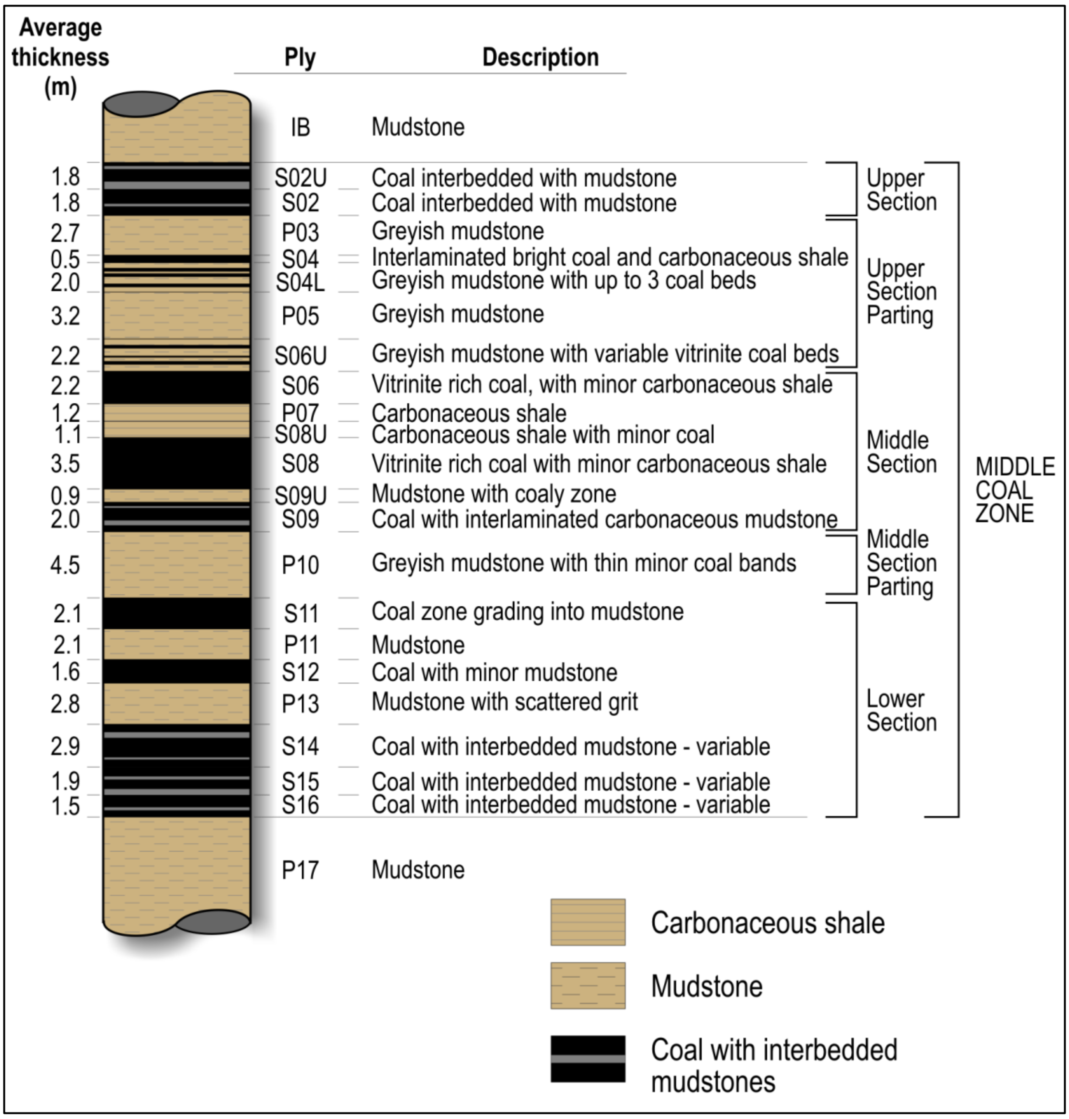

Figure 10: Detailed profile of the Middle Coal Zone indicating coal plies and partings

4.2.1.1 Upper Coal Zone

This zone consists of only one ply as described below.

S01: This ply should be regarded as a carbonaceous zone with minor coal content that includes greyish mudstone partings. This zone can be split into a number of units (up to 5) on lithological criteria but separate plies were not defined due to the high proportions of non-coal material generally present in this interval which render it unattractive from an economic exploitation viewpoint. In some cases the sampling of this Coal Zone was done in 2 sections and the sub-zones are then referred to as S01A and S01B. The ply is mostly absent in the south-western segment (Matsuri, Longford and Doorvaardt) of the project area and is best developed on Celine, Berenice and the north-eastern part of Doorvaardt; hence to the north (and east).

Between the Upper and Middle Coal Zones an interval of mudstone with an average thickness of 18 metres occur. This "interburden" tends to be devoid of coal laminae/beds.

4.2.1.2 Main Coal Zone

This zone is divided into up to 15 plies based mainly on lithological criteria but also taking into account mineability considerations in terms of economic feasibility of extraction.

The Plies are designated as follows:

S02U: This ply is present in most areas above S02 and consists of four coaly beds interbedded with greyish mudstone. It has an average thickness of 1.8 metres. The lower part of this ply consists of laterally continuous greyish mudstone that separates the coaly part of S02U from the underlying S02.

S02: This ply consists of three coaly beds – separated by mudstone - with the upper and bottom beds being the thickest and richest in vitrinite (bright coal) content. The ply's average thickness is 1.8 metres. This is the main coal development above ply S06 and forms the core of the coal in the "Upper Segment" of the Middle Coal Zone.

P03: This ply is effectively a greyish mudstone parting with carbonaceous content decreasing towards the lower part of Ply P03. It has an average thickness of 2.7 metres. A few thin coaly/carbonaceous beds and laminae are present in the upper part of P03; but it has no economic value (even as an add-in) as depicted by the analyses of LD00203 in borehole LD354_002 and DT00506 in DT355_005.

S04: This represents the upper coal bed of the "4-Peaks" and is the first appearance of Coal below the (very) grey mudstone of P03. Characteristically, S04 is underlain by a thin mudstone followed by a very thin coal bed/coaly laminae which in turn is underlain by mudstone containing siderite "clouds", an easily identifiable marker horizon that pinpoints the position of S04. This horizon consists of interlaminated bright coal and carbonaceous shale (seldom with a high ratio of bright coal to carbonaceous shale) interbedded with carbonaceous shale. On average, S04 is between 0.4 and 0.5 metres in thickness.

S04L: By discarding the upper coal bed of the "4-Peaks", one can't describe the rest of "S04" as a seam; hence the name "S04L". This can be described as a greyish mudstone parting containing (up to) three recognizable coal beds. SP04L has an average thickness of ±2.0 metres.

P05: P05 represents a greyish mudstone parting that contains extremely little carbonaceous/coaly matter. Siderite is often present towards the lower part of the ply, resulting in a recognizable density-high on the geophysical log, a good marker horizon. The little carbonaceous content present in P05 decrease towards the lower part of this unit. P05 has an average thickness of 3.2 metres. The "coal laminae" referred to in the previous description forms part of the ply below.

S06U: This ply consists essentially of greyish mudstone with a vitrinite-rich coal bed (of variable thickness) at the top with coal and/or carbonaceous beds in the middle of the unit. It has an average thickness of 2.2 metres with thicknesses of 2.5-2.6 metres in its best-developed areas.

This ply represents a sequence that previously formed the lower part of P05 or the upper portion of S06. Attractive thicknesses of coal beds at the top (and middle) of this ply in boreholes drilled on Longford 354 MS raised the possibility that this ply should be seen as a part of S06. The thickness of the upper coal (and middle) bed(s), however, decrease(s) towards the north and east to the point that the ply has no economic value in those areas. Even in its best-developed areas one has to question whether it qualifies as an add-in to S06.

P03 up to S06U represents the "Parting between Upper Section and Middle Section" of the Middle Coal Zone that corresponds to plies with little to no coal layers. This is followed by the "Middle Section" of the Middle Coal Zone that signifies the most abundant coal occurrence the seam.

S06: S06 is seen as one of the major target horizons of the Berenice Coal Project. Its thickness varies between 2.2 and ±4.1 metres. One can roughly delineate three coal beds in S06. The exact nature and vitrinite content of the middle and lower coal beds vary across the project area with a prominent parting between them being mostly absent. It is safe to consider these two coal beds with its intercalated non-coal material as a unit. However, to the east (on Cygnus) of the project area there is a marked increase in non-coal material in this interval.

The upper coal bed is generally of good quality but it has variable thickness. In general, the thickness of this coal bed seems to decrease towards the west. The greyish mudstone parting between the upper coal bed and the other two coal beds also varies in thickness. This has a significant influence on the quality of S06. In a few instances this resulted in S06 being subdivided in two samples: one sample being the upper coal bed and its underlying greyish mudstone; the other sample being the "unit" from the top of the middle coal bed to the base of S06.

P07: P07 is essentially an uneconomic parting between S06 and S08. Very thin coal beds and coal laminae can be present (mostly in the lower part of P07). These coaly beds may cause some uncertainty about the exact contact with the underlying S08, if the upper part of S08 is poorly developed. In most instances, however, this is a well-defined parting that is easily identified. The average thickness of P07 is 1.2 metres.

S08U: This ply consisting of carbonaceous shale with minor coal occurs immediately below P07. The ply is however not always present, and when delineated, is generally between 0.8 and 1.4 metres thick.

S08: S08 represents the most important target horizon of the Berenice Coal Project. It consists of bright coal beds, interlaminated bright coal and carbonaceous shale as well as a few thin (carbonaceous) shale partings.

It many circumstances one can identify three coal beds/coaly zones (better depicted by the gamma log). The middle coal bed is generally of the best quality with beds consisting exclusively of bright coal not being uncommon. The upper coal bed sometimes contains non-coal partings. Where sufficient "shaling-out" of the upper part of S08 occurred, the ply was subdivided into **S08U** and **S08**.

The base of S08 is not always well-defined as a thin parting between the lower coal bed and the first coal bed of S09 may cause difficulties in proper defining of ply-boundaries. In general, the coal of the lower coal bed is of inferior quality if compared to the middle coal bed. Sometimes a little siderite is present which may prove helpful with correlation. S08 (including S08U) has an average thickness of 3.5 metres.

S09U: This is mainly a mudstone with minor coal layers typically 0.9m thick.

S09: Consists of an upper coaly zone consisting of coal and carbonaceous mudstone followed by a mudstone parting and a lowermost coal bed with interlaminated/interbedded carbonaceous mudstone. In most cases the lowermost coal bed is thicker and of superior quality than the upper coal bed. Siderite is quite common in the lower coal bed, often showing up on the geophysical log as "a poor quality coal horizon". The average thickness of S09 is 2.0 metres.

S06 to S09 represents the "Middle Section" of the Middle Zone. Below S09 follows a thick parting (P10) separating it from the "Lower Section".

P10: Essentially, P10 is a very thick (greyish) mudstone parting that includes a few thin, isolated coal beds/zones. Towards the base it is devoid of carbonaceous material and has a greyish/grey colour. In some areas it contains little scattered grit (more common in the middle of the project area than towards the west) whereas thin, coarse-grained sandstone beds occur near or at the base in a few areas. A thin gritty mudstone layer is also commonly present near the base of P10. A concentration of siderite in the lower part of P10 is commonly present and depicted by a density-high on the geophysical log. P10 has an average thickness of 4.5 metres.

In some instances, a coal bed is developed within the mudstone towards the base of P10. Regional continuity of this coal layer is still to be investigated.

Below P10 one can consider all coal developments to be grouped together as the "Lower Section" of the Middle Zone. Large variations in thicknesses occur from this point onwards. It is interesting to note that the thickness and presence of P10 is relatively constant.

It is worth visualizing S11 and S12 as a zone between P10 and P13 that contains coal. Then one appreciates the vast differences in distribution and thickness of the coal plies that occur in this part of the succession.

S11: Comprises a coaly zone at the top with systematic gradation into a shale/mudstone towards the base. In some cases the upper coaly unit is significantly well developed. It is worth representing S11 as follows:

1. Uppermost coal bed. Usually good quality;
2. Mudstone parting (commonly containing bright coal laminae) with variable thickness;
3. Another coal bed/coaly zone that contains carbonaceous shale. Usually of worse quality than [1], also containing siderite in many instances;

S11 is on average around 2.1m thick, totalling 4.2m.

P11: Prominent mudstone parting that has great variability in thickness. Sometimes it contains very little faint scattered grit. Average thickness of this parting is around 2.1m.

S12: Once P11 is identified, S12 can be regarded as the zone containing coal below P11 and above P13 (which may be easier to locate than other units). S12 is a highly variable unit with the majority of coal (as well as the best coal) in the upper part of the ply. This upper coal bed has variable thickness and may be underlain by mudstone (which varies even more regarding thickness). Below the mudstone (if present) follows a carbonaceous/coaly zone commonly consisting of predominantly carbonaceous shale - containing coal laminae - interbedded with minor coal beds. The lower part of S12 commonly contains scattered grit and coal laminae that seems to reflect "slumping". The presence of scattered grit and gradual decrease in coaly/carbonaceous content is reflected by a gradual contact between S12 and P13 in a few areas.

Where the mudstone in the middle of S12 is thin or absent one finds that S12 is rich in coal and may produce good coking coal yields. Although coal quality varies laterally S12, on average, represents the best coking coal target horizon within of the "Lower Section" of the Middle Coal Zone. The average thickness of S12 is 1.6 metres.

P13: P13 is characteristically a mudstone parting containing an abundance of scattered grit, a prominent marker horizon. Towards the base one may encounter gritty mudstone, whereas minor sandstone has been identified in the unit. Another typical feature of P13 is the presence of siderite as small nodules/"clouds". A thin coal bed is developed in the middle of the unit in a few instances.

As with most plies below P10, this ply also displays markedly variable thicknesses: ranging from less than 30 cm to ±5 metres. In a few areas P13 does not contain scattered grit. This may be a local feature. The average thickness of P13 is 2.8 metres.

S14: The coal bed (S14) is usually of very good quality and can reach an attractive thickness in some areas up to 3.2m. A few thin coal beds may be present below this upper coal bed, interbedded in a mudstone parting that varies greatly in thickness.

S15: Below this mudstone one encounters the S15 coal zone, on average 1.90m thick, containing (mostly thin) coal beds followed by a zone with very little coal (mostly mudstone).

S16: This coaly ply seems to be developed only very locally and is not continuous over large areas. It can be described as highly sideritic coal interbedded with mudstone.

The S14-S16 plies are typically laterally discontinuous and where present highly variable in thickness with the siderite content of the coal increasing from S14 towards the S16 (the base of these plies).

The coal beds present in the "Lower Section" of the Main Coal Zone generally consists of a higher Bright Coal to Carbonaceous Shale ratio than those of the Middle and Upper Sections (containing coal beds typically consisting of interlaminated bright coal and carbonaceous shale) and generally also contains a higher siderite content.

4.2.1.3 Lower Coal Zone

The Lower Coal Zone is not consistently developed and is absent over elevated palæo-topographic (basement) "highs". Coal development in this horizon appears to be restricted mostly to the western section of the Berenice area. The "Lower Coal Zone" probably represents a carbonaceous zone where coal is developed sporadically in different parts of the succession making correlation difficult.

The Lower Coal Zone is overlain by mudstone that seems to be devoid of carbonaceous and/or coaly content. Scattered grit is also present in some areas with minor diamictites occurring in the succession. Carbonaceous content gradually increases towards the base to the point that carbonaceous shales are identified with minor coal occurrences found in the vicinity of diamictite and sandstone beds. If a coal layer is developed, it is called the S18 ply.

S18: The coal is mostly dull to shaly with minor occurrences of dull-lustrous coal and bright coal bands. This is typical of (rather poor quality) coal found in the Vryheid Formation of the Main Karoo Basin.

Analyses of the coal present in the "Lower Coal Zone" shows no sign of coking/caking properties.

4.2.2 Coal Ply Details

The surface topography is generally flat, with a gentle dip to the north towards the Brak River valley as presented in Figure 11.

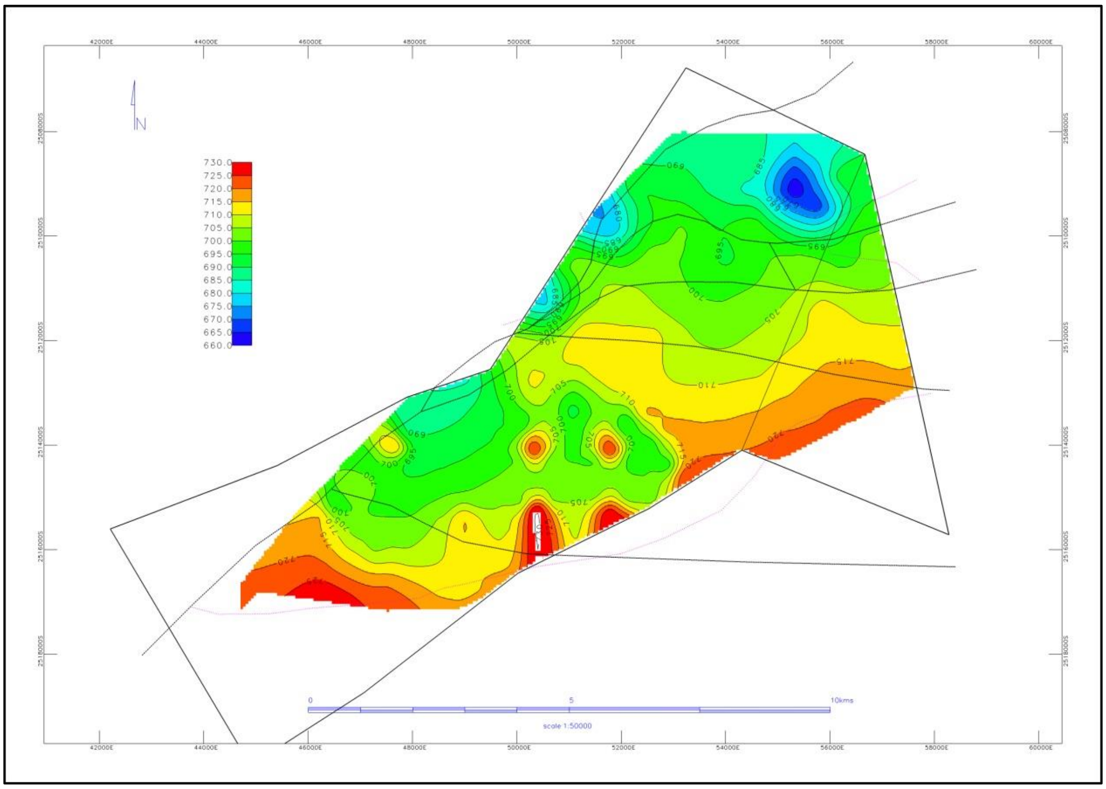

Figure 11: Surface topography contours at 5m intervals (mamsl)

In terms of anticipated depth to the top of the primary coal ply (S08) of the Main Coal zone the general range applicable to the defined coal resource areas ranges from sub-outcrop (±25m) to 280m or more (Figure 12). Variations in depth below surface are mainly a result of the shallow dipping nature of the coal zones to the north, as well as the relative upward displacements along the fault zones. Depth below surface varies between 20-260m below surface, with discordant truncation of the coal units against pre Karoo basement to the north.

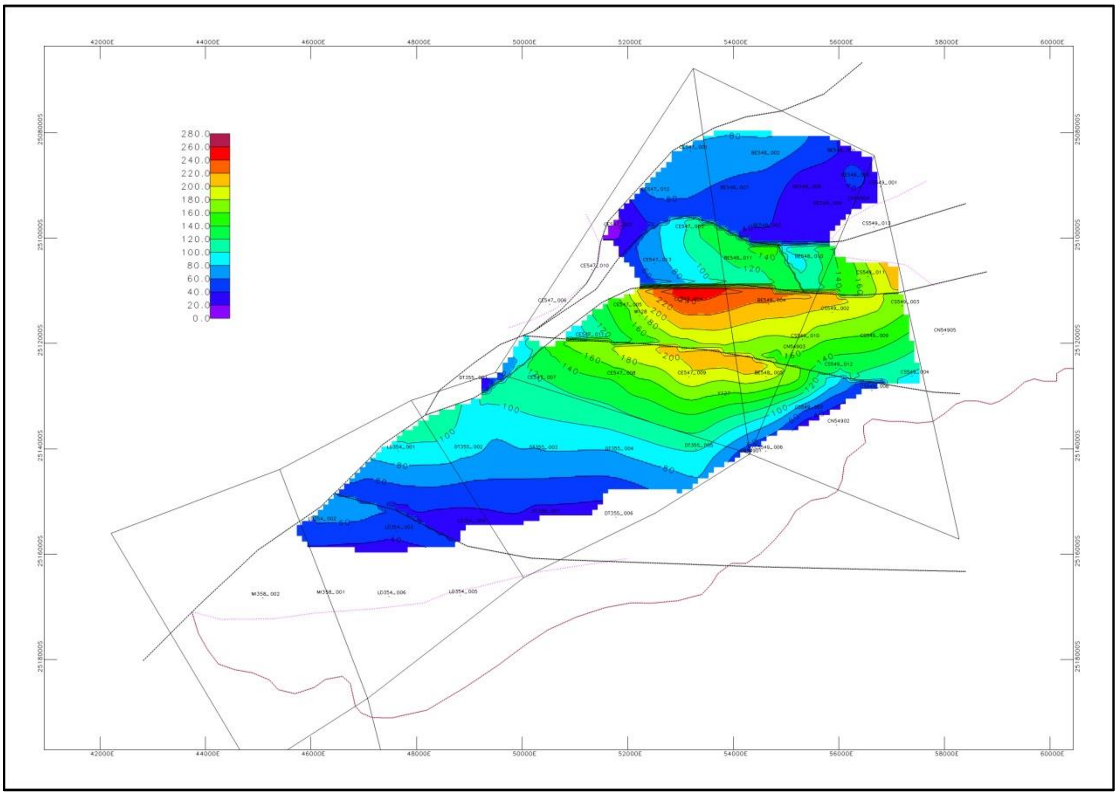

Figure 12: Depth below surface contours for coal ply S08 (taking weathering into consideration)

The average borehole depth below surface, average thickness as well as minimum and maximum depths for each ply are summarised in Table 4 below. The coal zones sub-outcrop towards the south of the project area, but minimum depths below surface (from a practical mining perspective) are only between 16-28m, largely as a result of the relative deep weathering profile. Coal ply thickness is on average between 1.2 to 3.5m, but for individual plies can reach thicknesses of up to 5.4m.

Table 4: Average, minimum and maximum coal depth and thickness per ply

Coal Ply	Average depth below surface (m)	Minimum Depth below surface(m)	Maximum Depth below surface(m)	Average Thickness (m)	Minimum Thickness (m)	Maximum Thickness (m)
S02	95.7	21.6	217.1	3.4	1.6	4.7
S04	98.1	20.5	221.8	2.7	0.4	4.2
S06	100.0	16.6	229.1	4.0	0.6	6.7
S08	102.6	15.1	233.6	3.5	0.3	6.2
S09	105.3	20.3	238.1	2.4	0.4	5.6
S11	110.4	26.4	245.7	2.3	0.5	6.6
S12	113.7	28.0	249.2	1.6	0.0	4.5
S14	107.4	32.8	259.1	2.8	0.5	5.6
S15	93.7	37.5	191.9	1.8	1.1	6.4

Overleaf are a number of plans illustrating the modelled seam thickness of each of the tabled coal plies. These plans also give an indication of the un-weathered development and extent of each ply, as well as sub outcrop positions in the resource area.

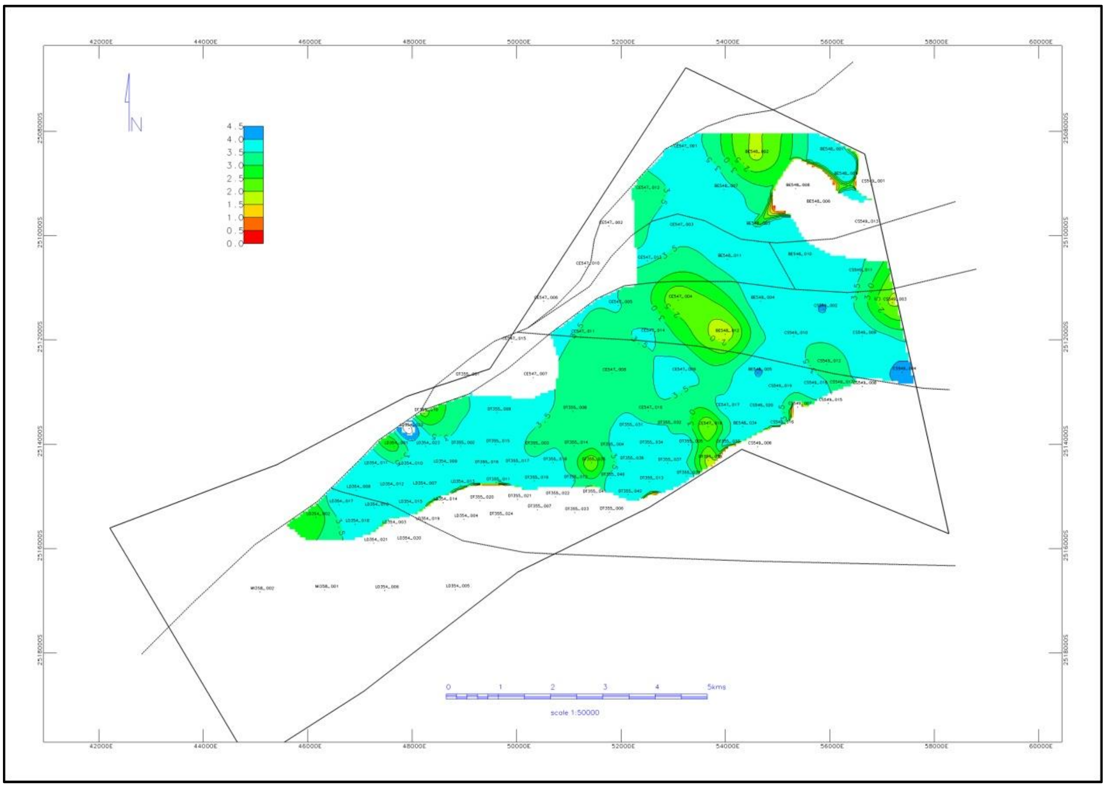

Figure 13: S02 ply thickness

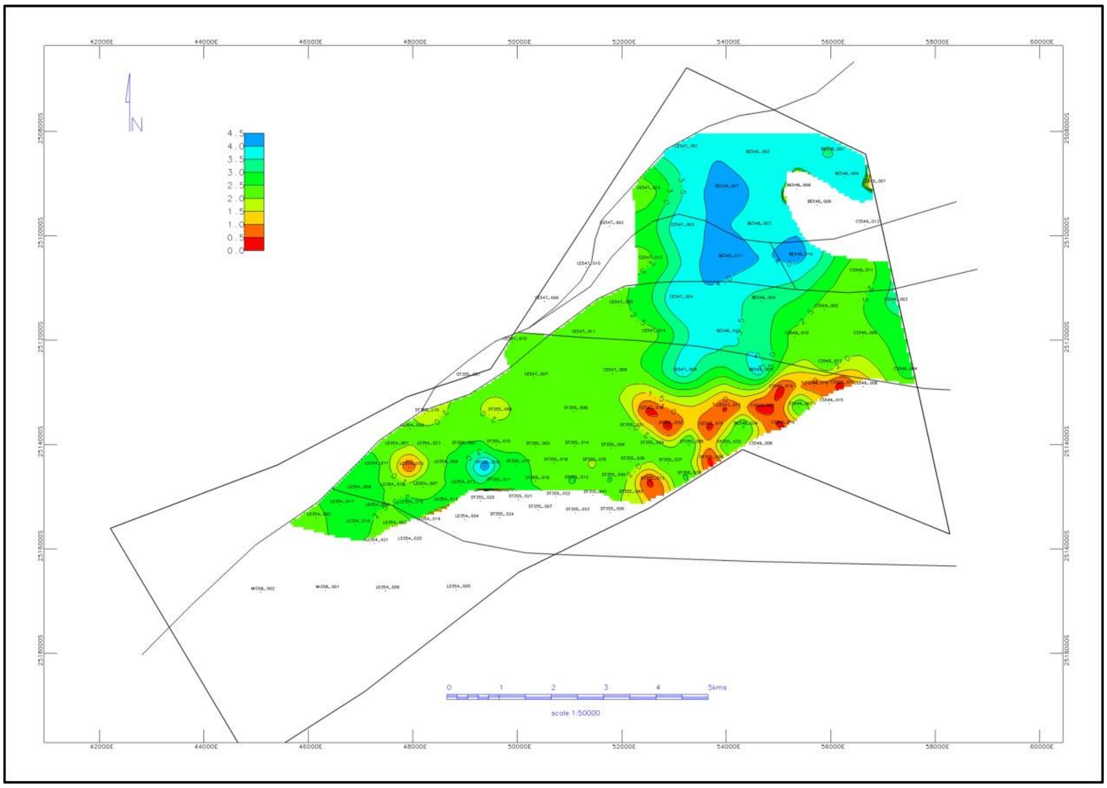

Figure 14: S04 ply thickness

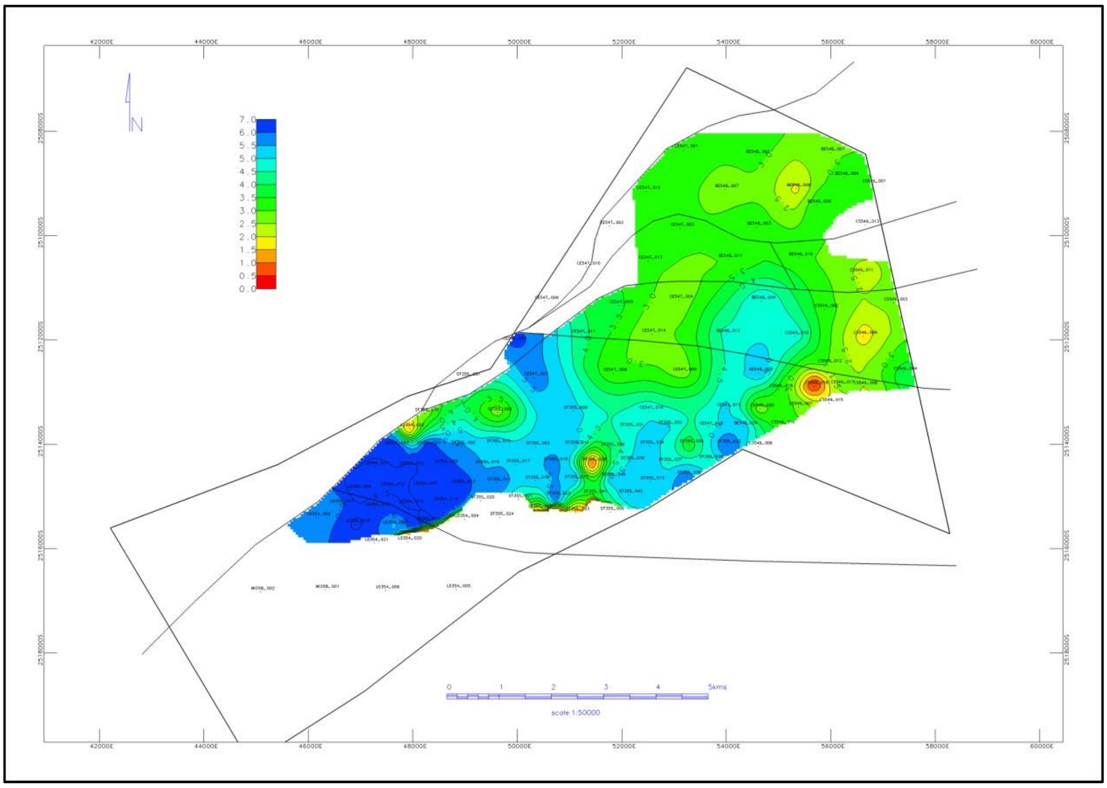

Figure 15: S06 ply thickness

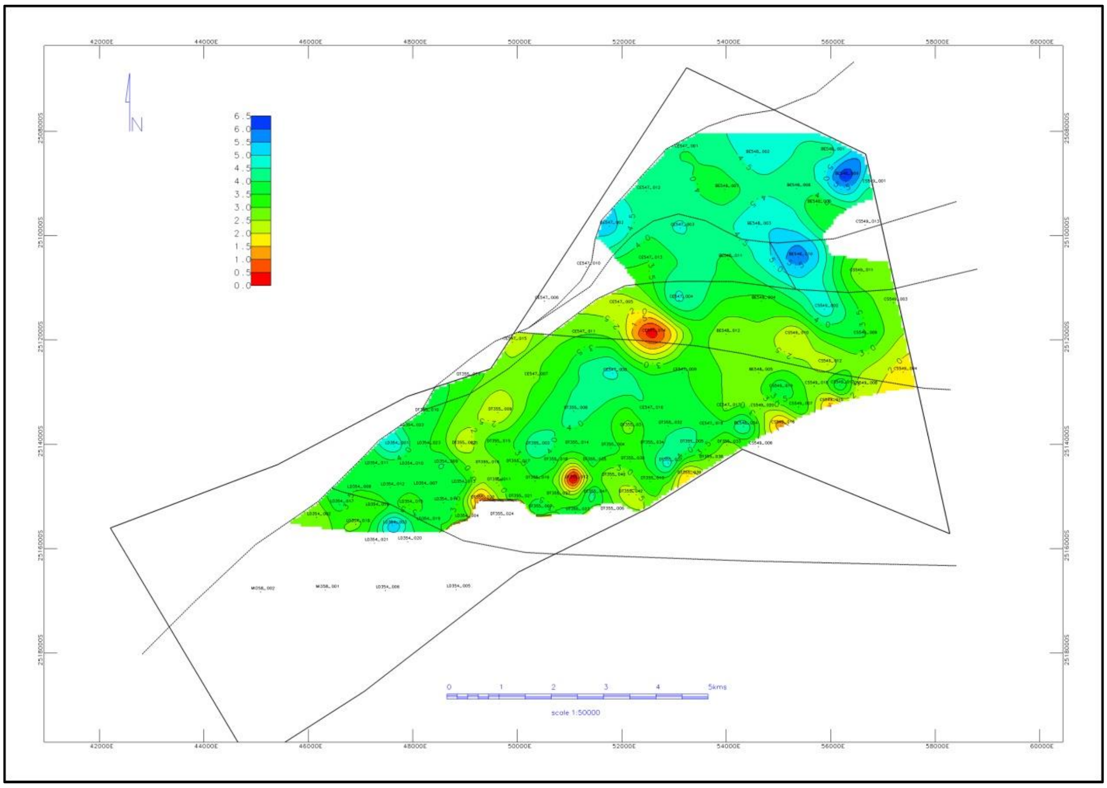

Figure 16: S08 ply thickness

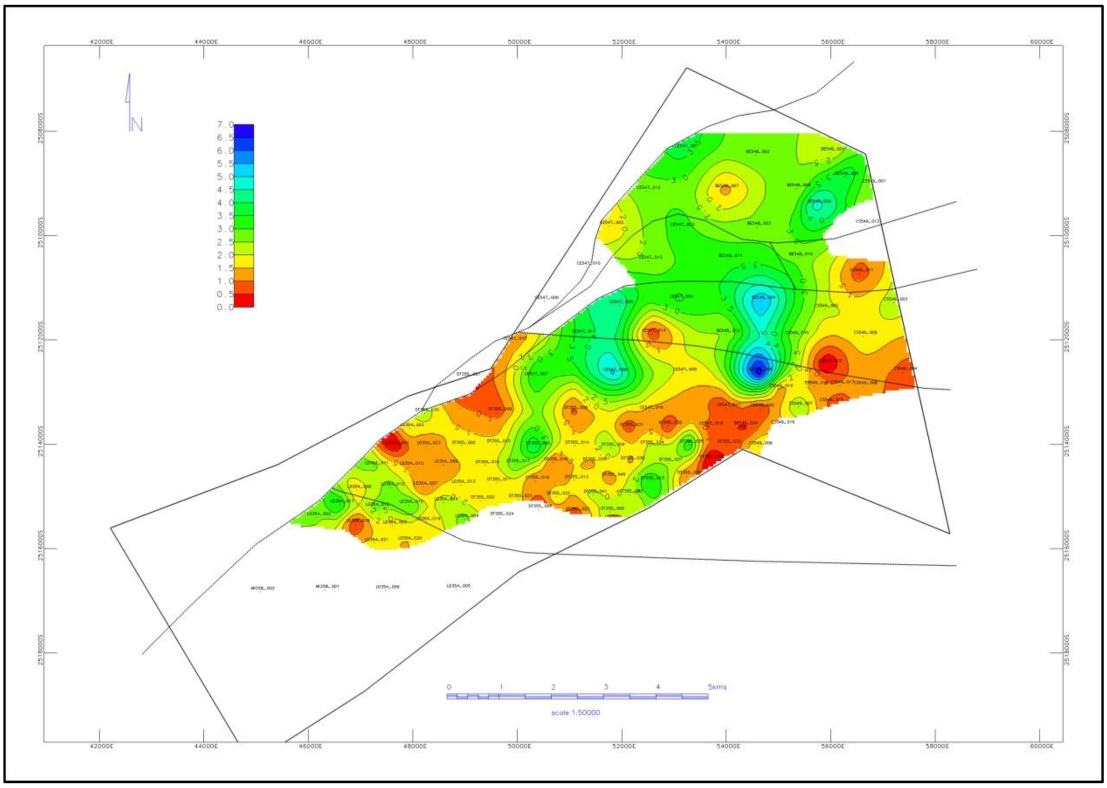

Figure 17: S11 ply thickness

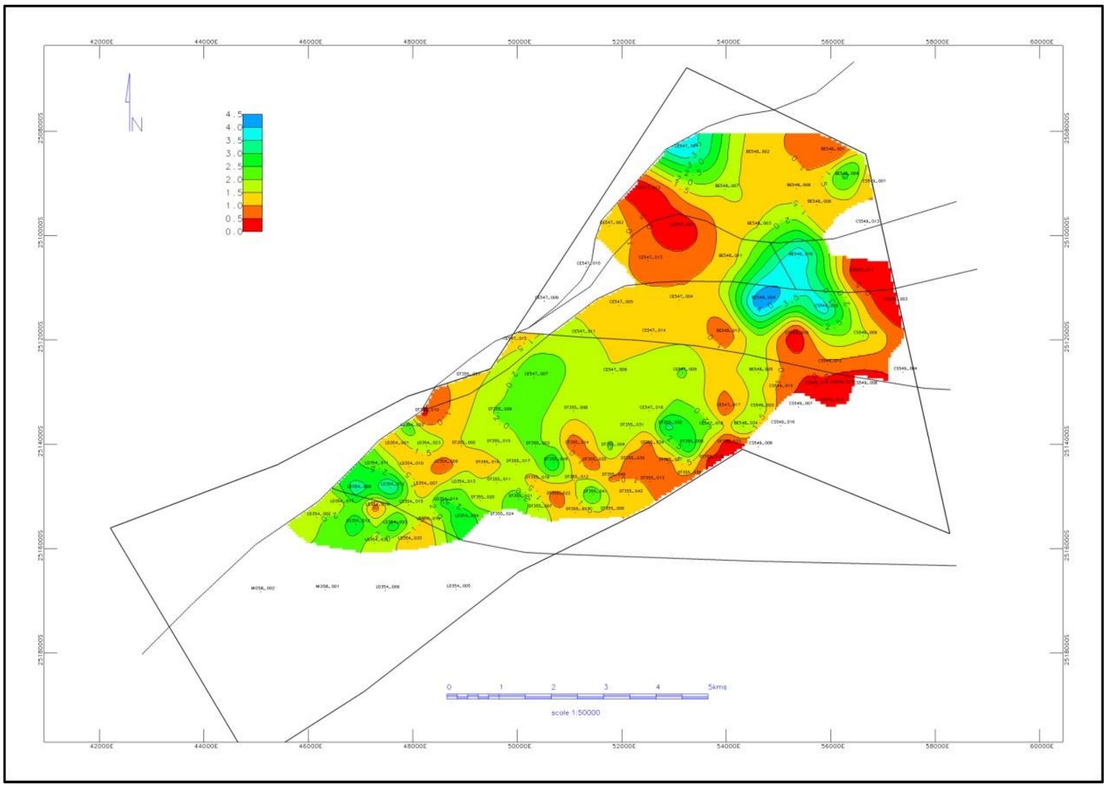

Figure 18: S12 ply thickness

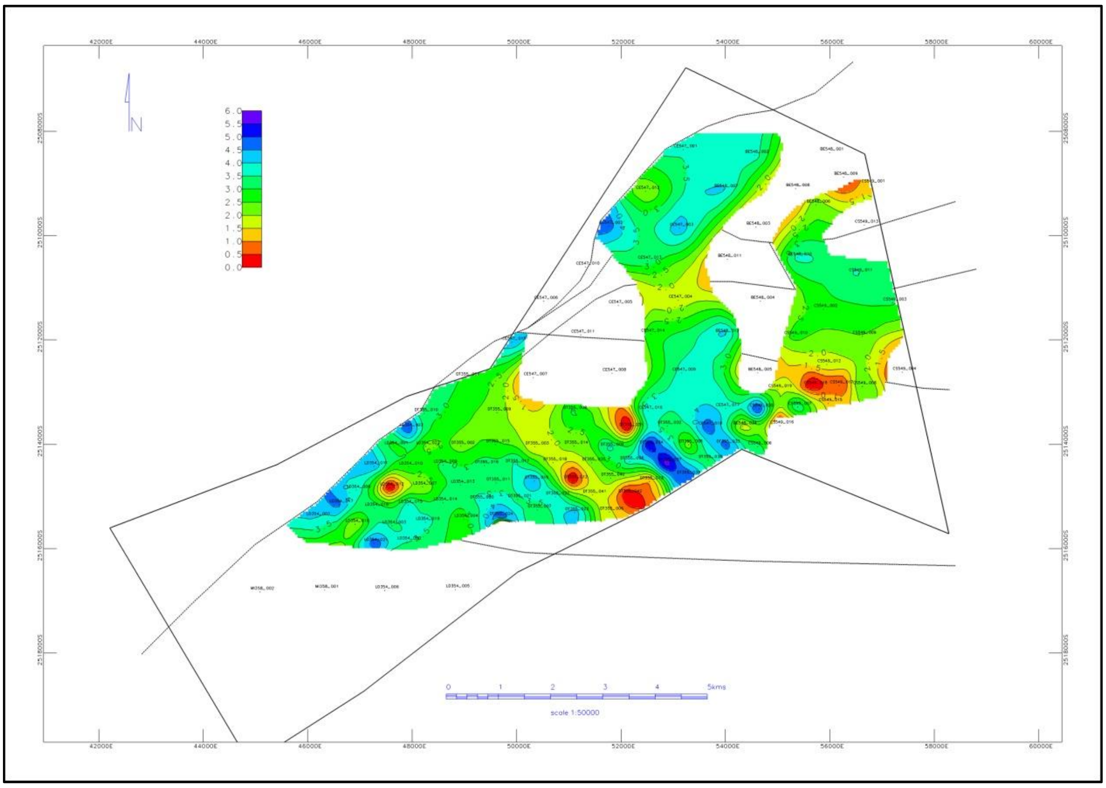

Figure 19: S14 ply thickness

4.2.3 Geological Structures

The envisaged geological structure has been interpreted based on the available borehole intersections, both historical and from Universal Coal's 1st phase drilling programme, and with reference to the published surface geological map. This interpretation has not been updated since the latest borehole results were obtained, as the client is awaiting a detailed aeromagnetic study and interpretation that will assist with the structural detail interpretation of the resource area. The current interpretation (Figure 20) is based on relatively wide-spaced data points it must be considered as somewhat conjectural and needs to be refined by infill drilling and airborne geophysical survey when available.

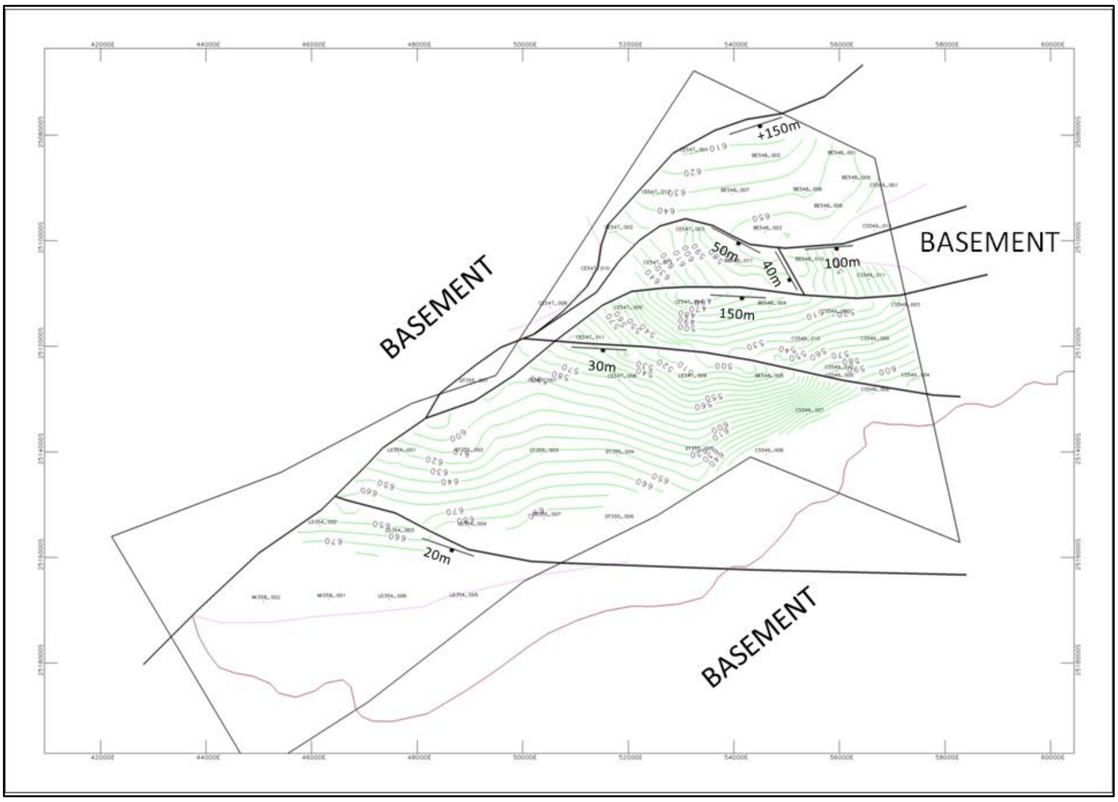

Figure 20: Geological structure of the Berenice project area

The coal measures are preserved within down-faulted (graben-type) structures. Dislocation of the coal measures by faulting both parallel to strike and at an angle thereto is indicated. Based on available data, the western section of the coal-bearing area of the Berenice project (farms Longford, Doorvaardt and the southern section of Celine) appears to be structurally more stable than further towards the north-east and east (Farms Cygnus, Berenice and the larger part of Celine). This results in generally larger coal resource blocks in the former area and higher structural complexity with smaller structural resource blocks elsewhere.

Regional dip appears to be towards the north with local deviations towards the north-east or north-west presumably due to block rotation of strata between fault zones or resulting from presently undetected cross-faulting (Figure 21). Dips generally vary between 1.5°-6° with the average dip of the strata for the individual resource blocks as follows:

- OC1 Area: 3.1°
- OC2 Area: 1.5°
- OC3 Area: 2.6°
- OC4 Area: 2.6°
- UG1 Area: 4.0°
- UG2 Area: 4.0°
- UG3 Area: 3.3°

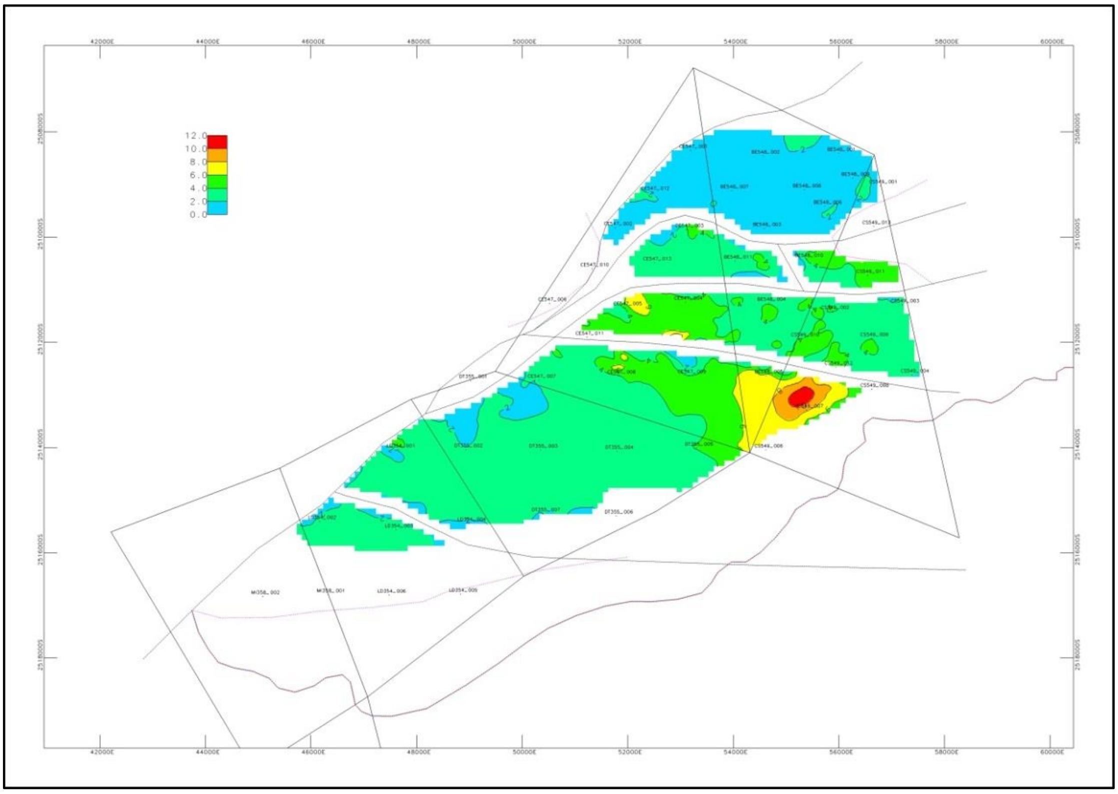

Figure 21: Regional dip variation of strata within the structural blocks in the resource area

Where intersected by drilling (eg. BH CS549-005), the predominant west-east faulting pattern appears to be represented by faulted zones, the width of which has yet to be established. The block faulting pattern cannot be properly explained based on the available information, this being particularly the case in the central portions of farms Celine, Berenice and Cygnus, where a complex structural pattern is suggested by the borehole data (coal zone elevations, etc.).

Preliminary structural interpretation suggests that fault displacements of between 20 and 170m define the major structural blocks of this area. In general, the more southerly strike faulting appears to cause displacements of up to 50m, while faults further to the north are expected to exhibit larger displacements. Cross faulting with significant displacements can also be postulated. At this stage the structural interpretation must be considered as tentative and in some areas is considered to be highly conjectural, with several alternative interpretations which fit the available geological data. It is most likely that additional exploration and geophysical work will elucidate a somewhat more complex pattern of fault displacements.

4.2.4 Geological Cross Sections

To illustrate the general structure and variable dips of the coal horizons, a selection of cross sections of the main coal zones are presented below. Note the horizontal to vertical scales are exaggerated between 8-10 times, resulting in visually exaggerating the dips. These sections are based on the current structural interpretation as discussed above in paragraph 4.2.3, and will be updated as the level of knowledge increases following interpretation of the airborne magnetic survey data once it becomes available.

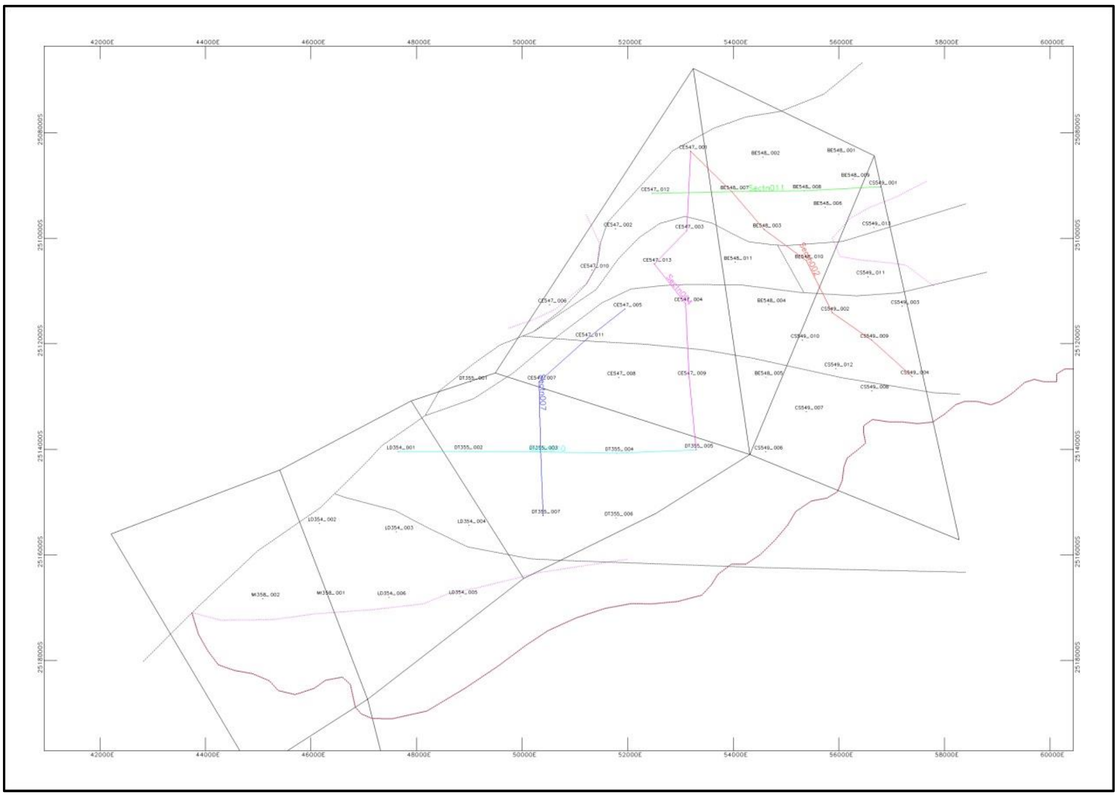

Figure 22: Plan indicating cross section lines

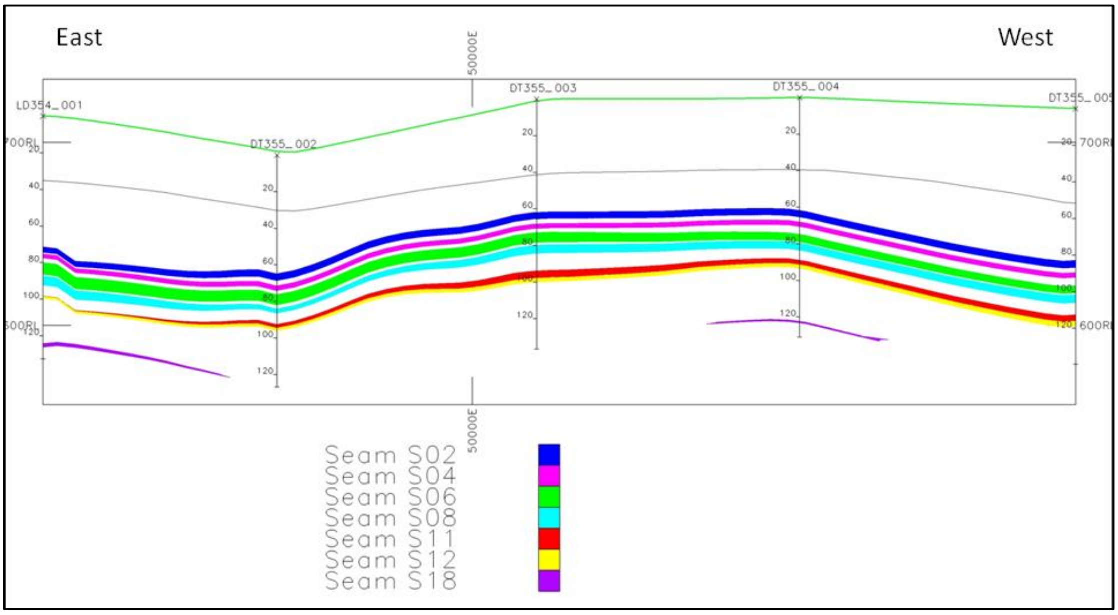

Figure 23: Section10 (West East Strike) South Block (Vertical scale visually exaggerating dip)

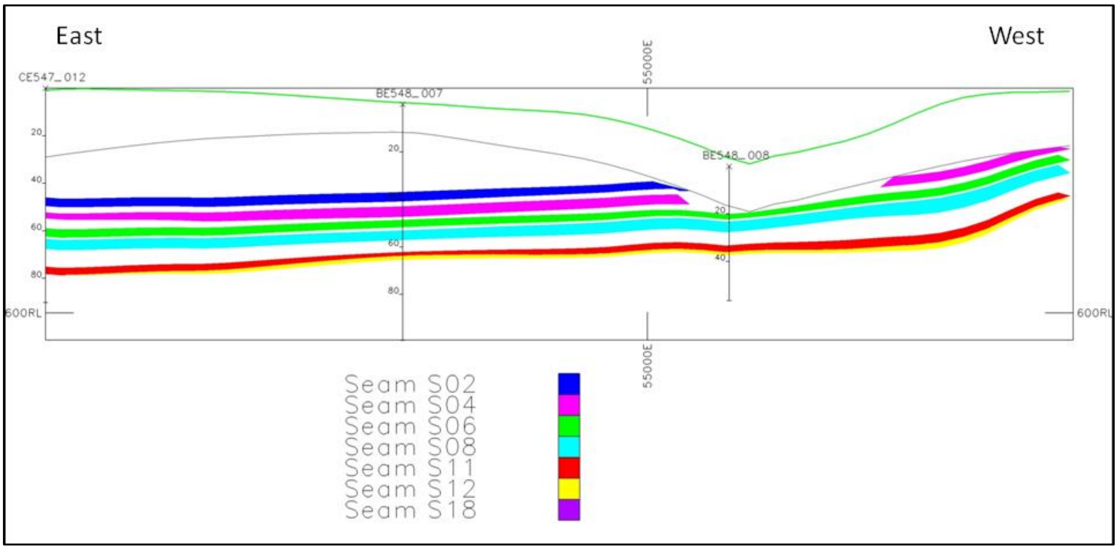

Figure 24: Section 11 (West East Strike) North block (vertical scale visually exaggerating dip)

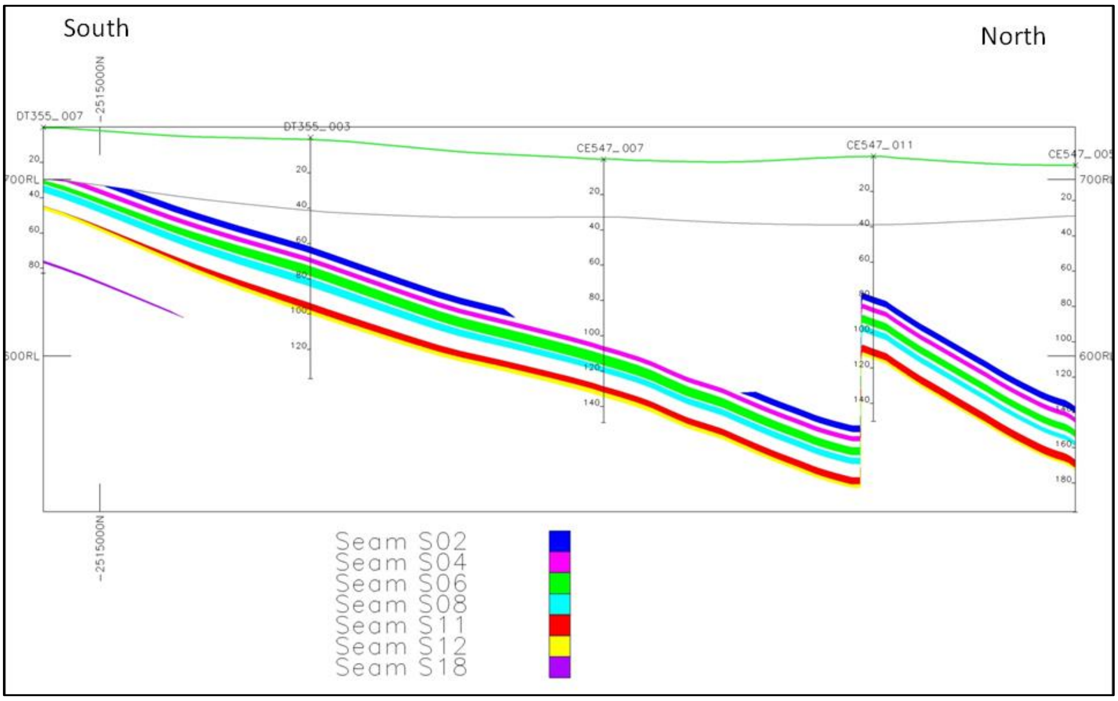

Figure 25: Section 7 (South North Dip) South block (vertical scale visually exaggerating dip)

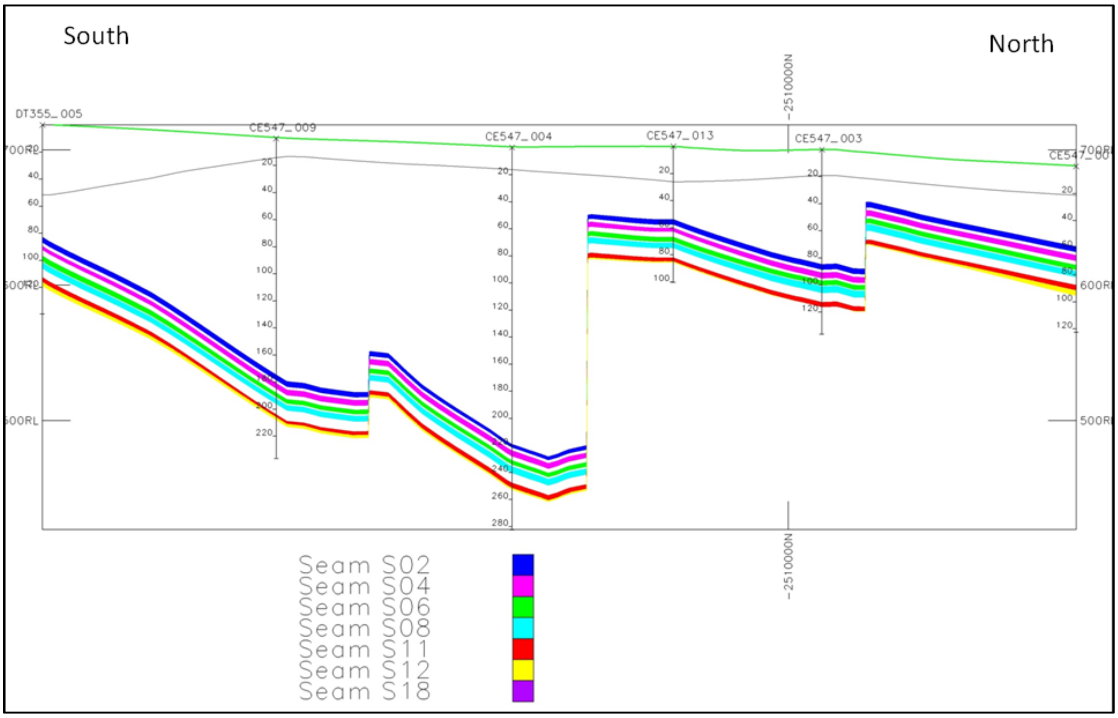

Figure 26: Section 4 (South North Dip) South, Central and North Blocks (vertical scale visually exaggerating dip)

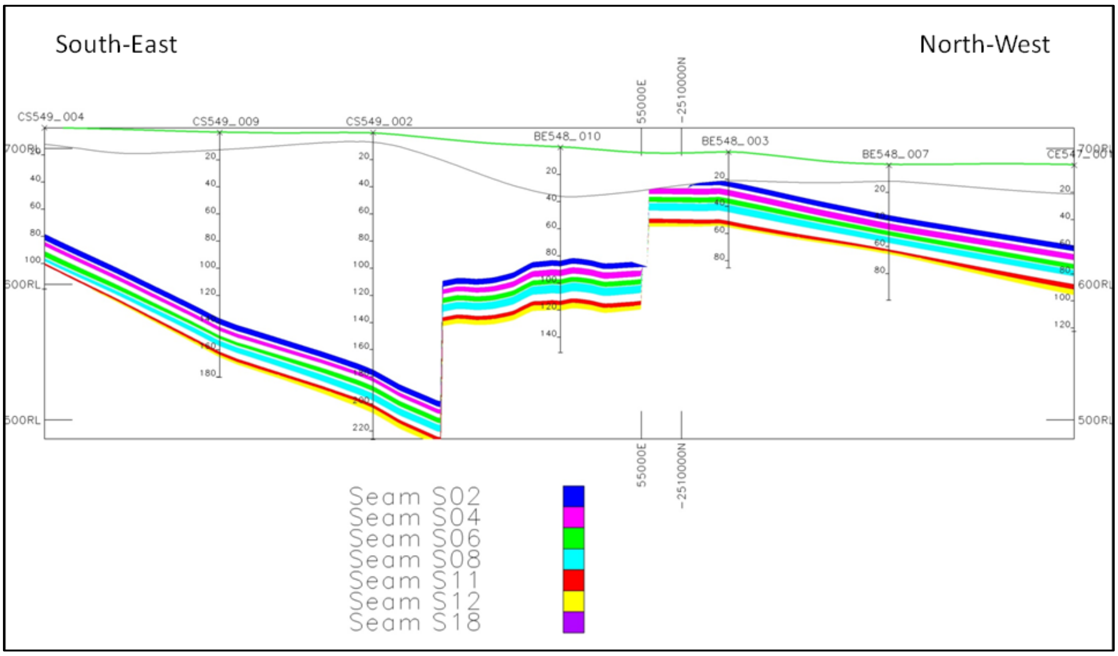

Figure 27: Section 2 (South-East North-West Diagonal) Central and North Blocks (vertical scale visually exaggerating dip)

4.2.5 Weathering

Weathering depths appear to vary significantly from place to place across the area depending essentially on the immediate bedrock type concerned. Weathering depth recorded in drill-holes range from 3.7m to 58.2m with an average of 26m. Due to weathering and denudation effects the coal zones in some areas are absent or the chemical characteristics of the coal have been adversely affected. Coking properties in particular are especially sensitive to even slight weathering effects. The depth of weathering variation is indicated in Figure 28 overleaf.

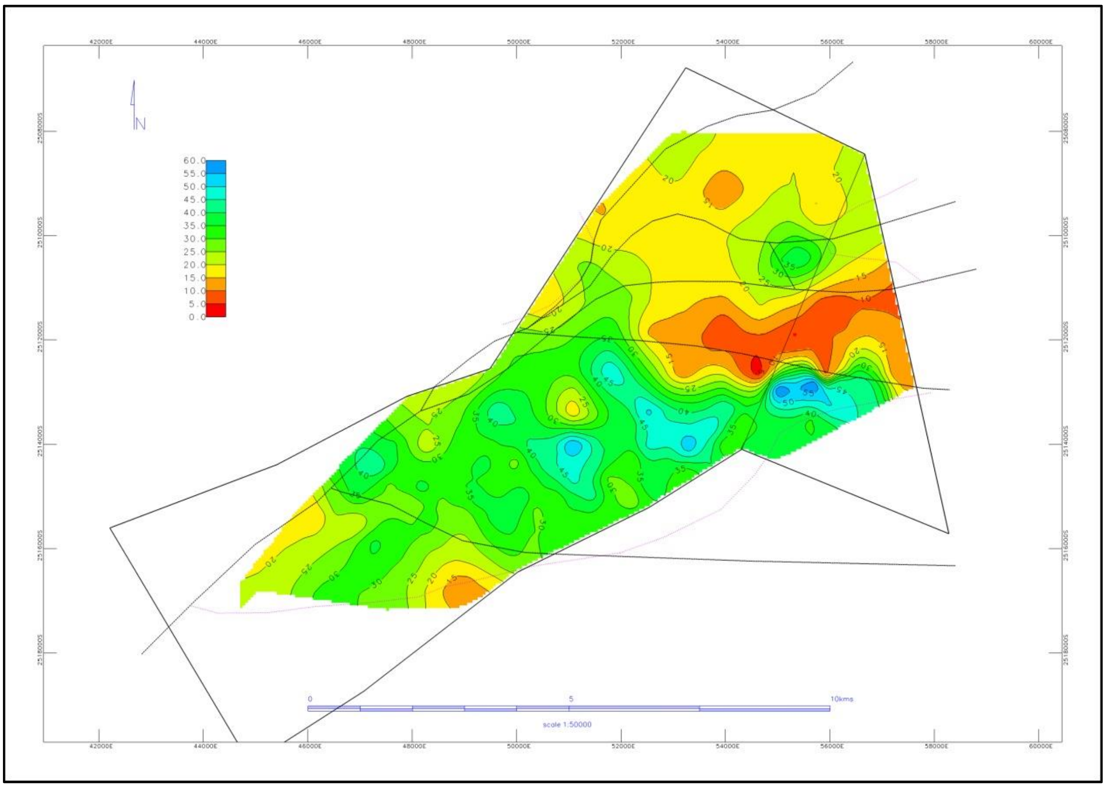

Figure 28: Depth of weathering

5. EXPLORATION

5.1 Historical Exploration and Previous Resource Estimations

Geological mapping of the general extent of the Karoo strata in this area has been done by the RSA Geological Survey over many years (published maps sheet 2228 'Alldays', 1:250 000, 2000).

Five borehole sites were drilled by Trans-Natal Coal Corporation, a subsidiary of General Mining & Finance Corporation, on the farm Cygnus 549MS in 1974 as a part of the evaluation of coal deposits in their so-called Langjan Proposition. Four of these sites are located on the boundaries of the property. No details as to drilling or other procedures employed in historical prospecting are known. Diamond coring techniques were employed for the prospecting boreholes to recover an NX-size core. Due to core losses through coal zones of the nature of those in this locality which are not easy to core, there could be some dilution of coal quality in these boreholes.

Goldfields of SA drilled 2 boreholes (Y127 & W128) in 1977 on the farm Celine 547MS at some stage, but only limited information concerning this work is available.

This area was identified by Rio Tinto Mining and Exploration as a potential coking coal source in around 2003. This organization previously held Prospecting Rights, in a JV with Khwezi Mining, in this locality, encompassing the farms Berenice 548MS, Celine 547MS, Cygnus 543MS, Doorvaardt 355MS, Longford 354MS, Mansfield 356MS, Renfrew 628MS and Thurso 619MS. This area was known as the "Brak River Block". It is known that at least 4 boreholes were drilled circa 2004/5 in this block (one each on Cygnus 549MS, Berenice 548MS, Celine 547MS and Doorvaardt 355MS).

The location of historical boreholes is indicated on the following map (Figure 29), with Goldfields indicated in green, Trans Natal in Magenta and Rio Tinto indicated in orange.

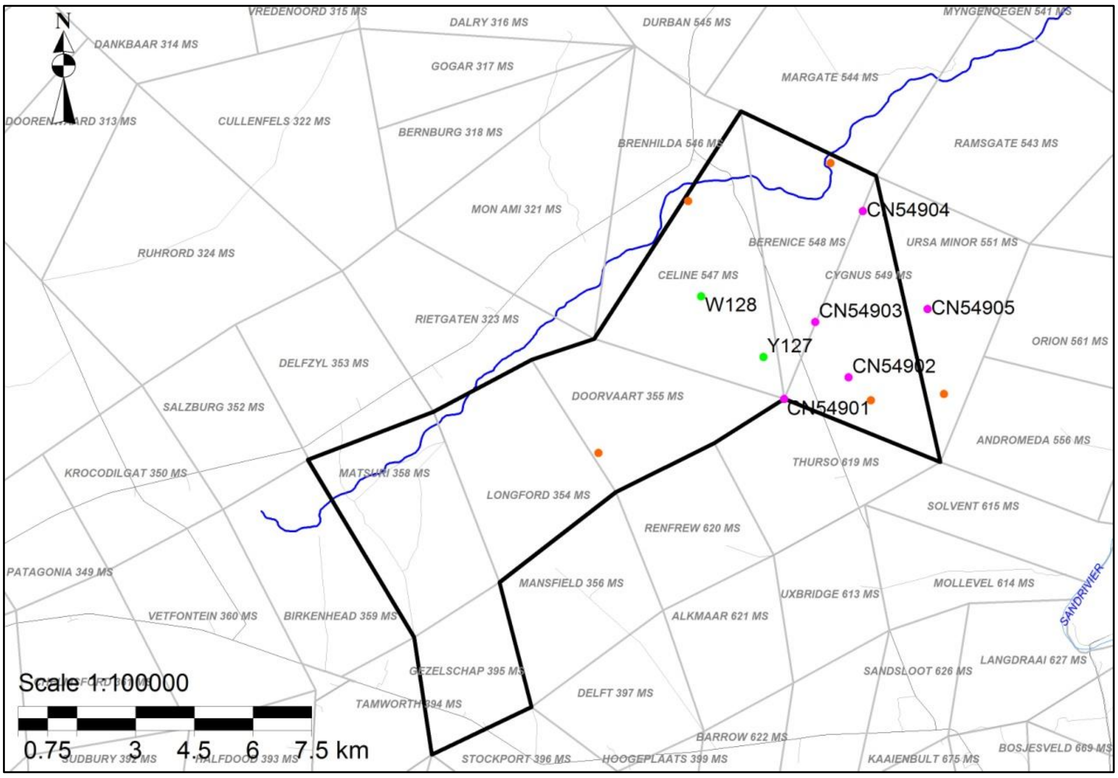

Figure 29: Location of historical boreholes drilled on CYGNUS 549MS, CELINE 547MS & DOORVAARDT 355MS

Venmyn Rand Consulting conducted an assessment of part of the project area for Pioneer Coal in 2008. A gross in situ tonnage of some 127 Million tonnes was reported for the three coal zones (A, B & C) developed on the farm Cygnus 549MS. Venmyn classified these resources as of "Inferred" (SAMREC) status.

In September 2010, Gemecs (Pty) Limited produced a CPR covering a portion of this and other areas for Universal Coal plc. A potential coal resource was determined for portions of the farms Berenice 548MS, Celine 547MS and Doorvaardt 355MS, based on limited historical borehole data projected from the farm Cygnus 549MS (at that time farm Cygnus was not a part of the project area).

A resource of 244 Mt GTIS (147Mt TTIS) was estimated over the coal zones (coal + mudstone) within this area. A resource of 122 Mt GTIS (73 Mt TTIS) was estimated for the coal component from 3 coal sub-zones. The abbreviations GTIS and TTIS refer to Gross Tonnes In situ and Total Tonnes in Situ, respectively, as defined in the SAMREC-code. GTIS represents the gross in situ resource for coal in the full coal zone above the defined minimum thickness and coal quality cut-offs (as determined by the competent person), whilst TTIS incorporates geological loss factors (physical and model estimation error losses).

In January 2011 when the farm Cygnus 549MS had been added to the project area, a further geological resource report was compiled by Gemecs covering this property. The potential indicated resources at that time (January 2011) were estimated at totalling 174 Mt GTIS (104Mt TTIS) as estimated over the coal zones (coal + mudstone) on farm Cygnus. A resource of 95.5Mt GTIS (57Mt TTIS), was estimated for the coal component only from 3 coal sub-zones.

5.2 Exploration by Universal Coal plc.

5.2.1 Drilling

In 2010, Universal Coal identified this area as having potential for the presence of coking coal deposits. This was based on resource reports from the results of historical drilling reported previously.

Since 2010 2 phases of exploration core drilling have been completed on the Berenice Project area. A plan indicating total borehole coverage to date is presented below in Figure 30. Light blue represents historical boreholes, black phase 1 holes, and green phase 2 drilling. A total of 52 small diameter boreholes were drilled as part of phase 1 (2011), and were followed by another 60 small diameter boreholes during phase 2 (2012) totalling 112 boreholes and 14,725.21m. The second phase (2012) focussed largely on drilling out the southern shallow (open cast) portion of the coal deposit. All primary (small-diameter) boreholes were fully cored from surface to below the lowermost carbonaceous horizon and in some cases to basement rocks. Refer to Table 5 overleaf for a summary of the exploration drilling per farm.

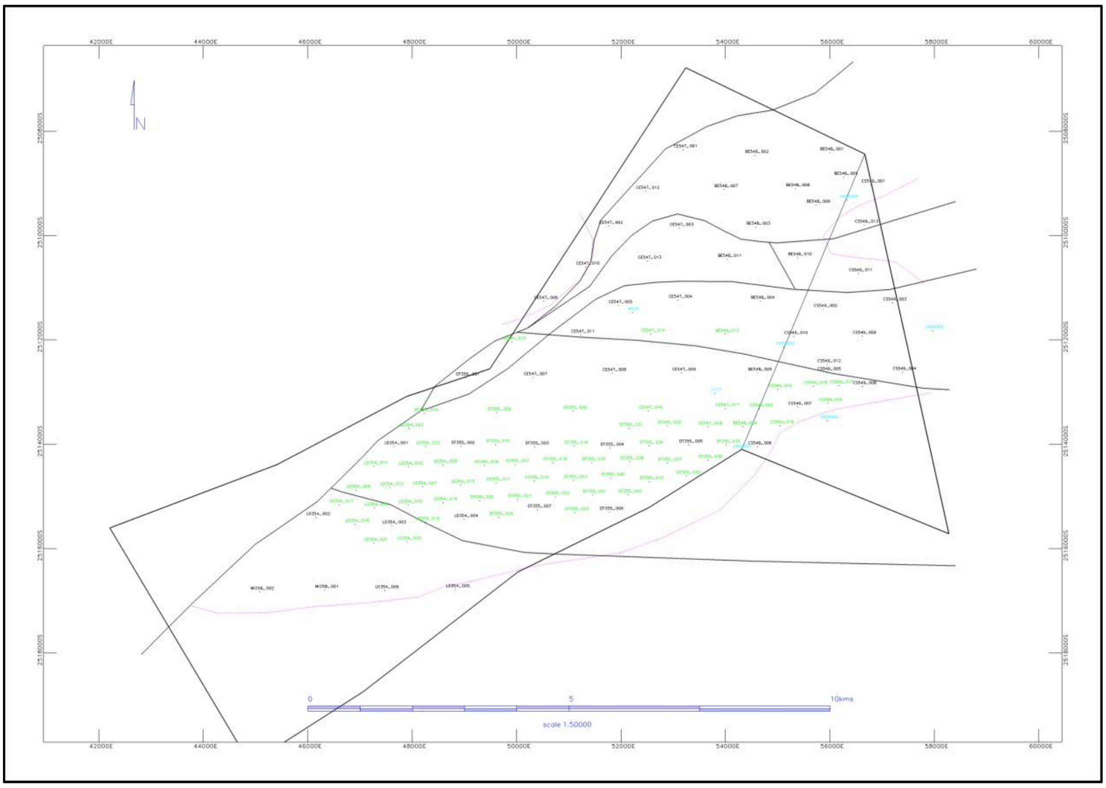

Figure 30: Plan showing borehole localities for the Berenice Cygnus project

Table 5: Small diameter boreholes drilled in phase 1 & 2 of the exploration programme

FARM NAME AND NUMBER	NUMBER of BOREHOLES	NUMBER of POSITIVE COAL INTERSECTIONS	REMARKS:
Berenice 548MS	13	13	
Cygnus 549MS	20	18	Includes 1 re-drill due to fault zone intersect/2 BH behind coal measures sub-outcrop.
Celine 547MS	18	16	2 BHs behind coal measures sub-outcrop / 1 BH in fault zone.
Doorvaardt 355MS	36	36	2 BHs affected by dolerite intrusions
Longford 354MS	23	21	1 BH behind coal measures sub-outcrop / 1BH behind Main coal zone sub-outcrop
Matsuri 358MS	2	2	Behind sub-outcrop of Main coal zone
	112	**106**	

Additional 22 large diameter holes (T6-146 core size) providing a nominal 123mm diameter core, and twinning approximately 20% of the slim diameter bore holes, were drilled at selected drill sites across the area, but focussing largely on the southern shallow portion of the resource area (Figure 31). The purpose of the large diameter drilling was:

- to obtain sufficient sample for extensive coking and other beneficiation tests - the large diameter core drilling provides some three times more volume of core compared to HQ/TNW drilling.
- to obtain more precise yield and coal quality data - large diameter drilling conducted by CoAL at the adjacent Vele and Makhado coking coal projects returned substantially increased coking coal yields and qualities in comparison to the results obtained from the slim diameter resource drilling.

The large diameter boreholes were located immediately next to the primary slim diameter boreholes and were piloted by percussion drilling techniques to above the coal-bearing interval. The large diameter boreholes were advanced across the total interval of the indicated potentially productive coal horizons. In most of these boreholes a high level of core recovery (94-100%) was obtained.

Table 6: Large diameter boreholes drilled in phase 1 & 2 of the exploration programme

FARM NAME AND NUMBER	NUMBER of BOREHOLES
Berenice 548MS	2
Cygnus 549MS	3
Celine 547MS	3
Doorvaardt 355MS	8
Longford 354MS	6
Matsuri 358MS	0
	22

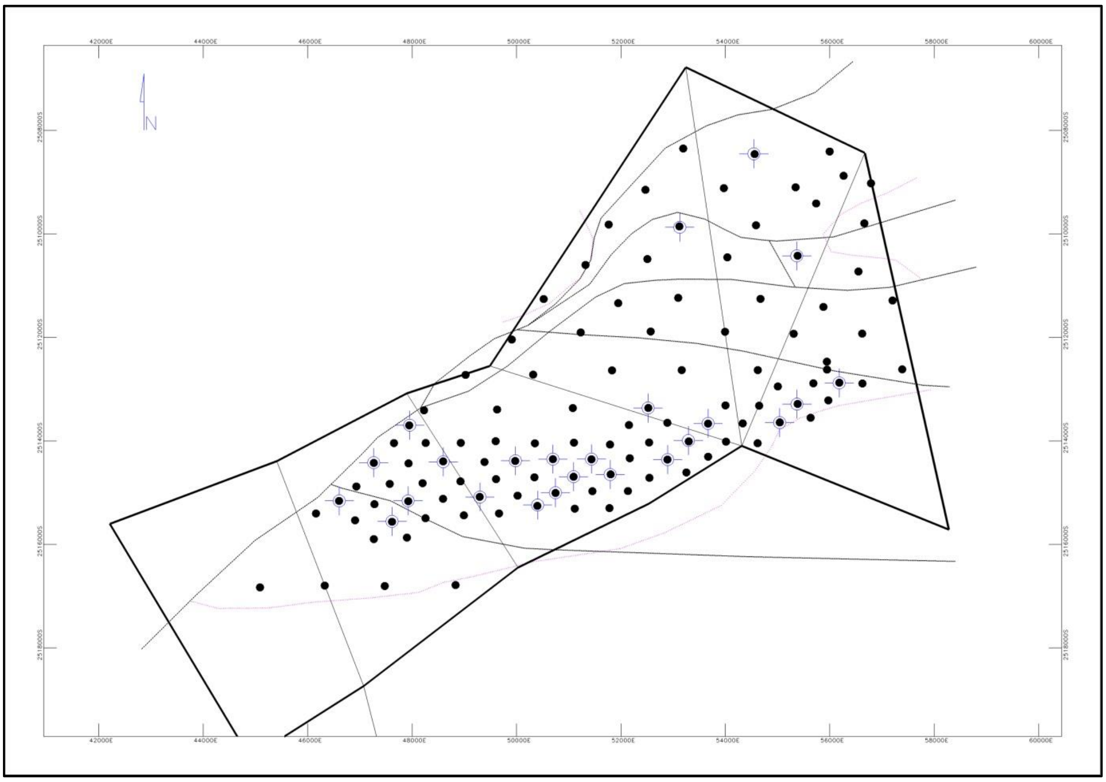

Figure 31: Phase 1 & 2 drilling programme borehole locations with large diameter positions. Black dots small diameter, blue cross large diameter holes.

Boreholes were positioned in the field by means of GPS positioning and final collar positions were surveyed by a qualified independent surveyor according to the SA Co-ordinate LO29 grid system based on the Hartebeesthoek 94 (WGS84) datum.

Boreholes were drilled by conventional and wireline coring techniques (HQ used for the deeper holes and TNW size for the shallower holes) with the large diameter holes being piloted by percussion drilling to above the coal bearing zones. Double-tube core barrels were used to intersect the coal zones. All boreholes were drilled by water-flush coring techniques and were drilled vertically. As far as practically possible core recoveries were checked in the field by means of stick-up measurements and calculations based on drill-string length.

Core recoveries over the coal zones, while mainly satisfactory, were poor in a few instances. The difficulties of recovering good core samples in coal zones of the nature of those at Berenice Project are well recognised. Drilling of alternating softer and harder layers such as the bright coal and mudstone/shale inter-bedded sequences in the Soutpansberg Coalfield, requires considerable expertise and proper drilling technique if a high sample recovery is to be obtained.

Results from the recent drilling indicate good recoveries over those sections of the Main Coal Zone which are largely or wholly of mudstone, but sometimes indifferent recoveries in the coal "plies" themselves. The average overall composite core recovery for "coal plies" from the small diameter drilling was 97.2% and for "parting" plies 98.8%. Core recovery over the Upper Coal Zone (where present) was in general good (range of 90-100%).

Wireline geophysical logging using a standard coal sonde recording long- and short-spaced density, natural gamma and hole diameter (calliper) was run in the majority of the boreholes (one or two holes could not be logged due to caving or poor hole conditions). Wireline logs were amongst others used as a check on driller's core recovery over the coal zones.

Two field geologists of Gemecs were permanently seconded to the project and their duties included the management and control of the drilling contractor and drilling activities, general field activities (including the positioning of bore holes, and rehabilitation of drill sites and roads), marking up of cores and logging/sampling. Borehole cores were logged lithologically and the total thickness of the Upper and Main Coal Zone intersections, as well as Lower Coal Zone where coal was developed, were sampled for analysis. The wireline log data, coupled to visual observations, was used to determine lithological boundaries of the various "plies" and coal 'zones' to assist in demarcation of sample boundaries.

5.2.2 Logging and Sampling

Cores were transported in metal core trays to core storage facilities at Vetfontein and Celine, where, depth correction (using wire line data), logging and sampling were completed. Extreme care was taken during transport, to retain the integrity of the core in the boxes. Core tray sized heavy duty foam sheets were placed in-between each core tray, to ensure core could not move or be damaged in any way. The balance of the cores (excluding the sampled coal zone intersections) is retained at the core sheds. Sampling was done in terms of whole core as is the norm in the Southern African exploration coal industry. The total coal-bearing interval of the coal zone(s) was sampled, with no partings excluded. Portions of the coal zone(s) which were weathered were excluded from sampled thicknesses.

Sampling of the coal zones was done on a lithological basis with cognisance being taken of the following:

- Compliance with Universal's local coal zone subdivision and nomenclature (Figure 9 &10);

- The overall zonation within the coal zones;
- Practical thicknesses from a mining viewpoint;
- Potential "add in" units to principal coal "ply' intervals;
- Potential for selective mining of shallow deposits (possible opencast exploitation areas).
- Core losses and likely effect on the validity of results (in cases of high core loss the relevant interval was not sampled for analysis).

Photographs were taken of the borehole cores marked up for sampling, for future reference.

Independent quality control and assurance was provided for the drilling project by TJ Fox, a senior geological coal consultant from Geofox Consulting, working in association with Gemecs (Pty) Limited.

All borehole sites were rehabilitated according to industry standards and in most cases a section of casing was left in the borehole, sealed with a cement plug and the borehole positions marked in the field by beacons. Closure certificates and before and after photographs for each borehole site were completed and filed.

5.2.3 Geotechnical Study

Geotechnical logging and analyses were done by independent rock engineering consulting firm, BigCRock Engineering CC. In total 6 representative boreholes were logged and tested across the properties. Geotechnical logging, field and laboratory testing were done on selected coal zones, in seam partings as well as overburden material. These tests included Impact Splitting Index, Uni-axial Compressive Strength Testing (UCS) and Brazilian Tensile Tests. Results are reported in the report: ***"Geotechnical logging – Alldays"*** and is available for input into general mine design, support and slope design studies.

5.2.4 Analyses

Coal samples were all submitted to Inspectorate M&L, a certified and SANAS accredited coal laboratory. Based on the experience and expertise base of this concern, the present authors have no reservations concerning the analytical results presented, in terms of compliance to the norms of coal analytical results.

Coal were analysed as follow:

- Small diameter core were split into a coarse (-25 to +0.5mm) and a fine (-0.5 to +0.212mm) fraction, and remainder fine fraction reported separately (-0.212mm).
- On the coarse fraction full washability testing were done on the following RD's
  - F1.30, F1.35, F1.40, F1.45, F1.50, F1.55, F1.60, F1.70, F1.80 and Sinks RD1.80
  - Full proximate analyses as well as CV and Sulphur analyses were performed on these fractions. Swelling Index, Roga Index and Phosphorous in coal were only tested if a swell index of more than 2 were observed.
- On the fines fraction the same analyses were performed as stated above, but at the following densities only:
  - F1.40, F1.60, F1.80 and Sinks at RD1.80.
- Similar testing was done on the large diameter samples, but core was split into a coarse (-12.5 to +0.5mm) and a fine (-0.5 to +0.212mm) fraction, and remainder fine fraction reported separately (-0.212mm). Only yield, ash and swelling index were analysed and reported for each fraction. Large diameter cores were also subjected to a complete set of processing tests (drop shatter, wet tumble, dry tumble, sizing and washing/analyses per size fraction, flotation tests on the fine fraction) and coking coal property analyses (ultimate analyses, caking properties, plasticity, dilatation and petrographic analyses), results of which is pending.

Note that washabilities of the fines fraction were only performed on the second phase (2012) drill hole samples.

5.3 Site visits.

Between 2010 and 2012 Gemecs was actively involved with the onsite management of the exploration drilling. During this time Gemecs had two full time geologists present on the site, and both the author as well as Mr TJ Fox, associate of Gemecs, visited the project site on a regular basis. The coal resource estimation is based on a geological model created by Gemecs during 2013, and includes all available borehole information, wireline logging and coal analytical data stored in a borehole data base.

6. GEOLOGICAL MODELLING

6.1 Coal Deposit Type

In terms of the South African Code for reporting of Mineral Resources & Reserves [SAMREC Code (2007)] and the "Guide to the systematic evaluation of coal resources and coal reserves" [South African National Standard 10320:2004, as amended], this coal deposit may be classified as a 'thick inter-bedded coal seam'-type deposit.

6.2 Coal Type

The coal zones in the project area contain a low density fraction (F1.30 to F1.40) which has potential to produce 'soft' coking coal that can be used as a blend in coke production. Additionally the higher density fraction (F1.45 to F1.80) has the potential to produce a thermal coal for both the export and domestic markets.

6.3 Geological Database

A borehole database was created in Micromine Geobank and all the relevant borehole information was imported into this borehole database. This included borehole collars, lithological descriptions, and coal zone unit interpretations, raw and fractional analyses and geophysical wireline logs. Coal sample positions were verified against coal seam occurrences as well as wireline interpretations, and raw coal analyses were compared to lithological descriptions.

6.4 Geological Modelling of Coal Resources

Geological modelling was performed using Geovia Minex™ software. Minex provides the best geology and mine planning tools for coal and other stratified deposits, ensuring resources are evaluated accurately and mined efficiently.

6.4.1 Structural Modelling

The modelling database is set up to model the individual coal plies. Historical boreholes were not included in the modelling process due to the lack of detail on the coal plies. Faulted and non-representative boreholes were also excluded. Large diameter boreholes were regarded as twin holes, and were not used in the general structure model. In total, 105 boreholes were used for the geological model. A three dimensional structural model, raw coal quality model as well as washability model was created for all the coal plies. The stratigraphical coal ply sequence was verified in Minex before structural modelling commenced. Coal extrapolation was limited to 500m from the last known borehole data point.

A topographic surface was created using the borehole collars, as no surface DTM is available yet. This area is relatively flat lying and the created surface corresponds with the expected topography. The limit of weathering as recorded in each borehole was modelled to act as a limiting surface to report un-weathered coal resources. Structural and quality modelling was done on a 50x50m grid interval. For each coal ply, a roof, floor and thickness grid was created. Due to the complexity of the ore body structure, and little additional information at hand to interpret any detailed structures, only the major fault structures and basement features were included in the modelling process. As more detail information i.e. aeromagnetic surveys, infill drilling become available, these structural models will be enhanced accordingly.

The S08 coal ply, being the most prominent and best developed ply in the project area, was used as a marker horizon to interpret and model faults structures and general coal ply structure across the resource area. Numerous cross sections were done across strike and dip to interrogate and validate the structural model. A total of 5 major fault zones, striking generally east-west were interpreted from the borehole data, with displacements ranging between 20-150m. This results in smaller fault (resource) blocks with variable dip and strike. Some of these blocks have limited borehole information, and regional dip and strikes were applied to achieve an acceptable structural interpretation and model. Known basement areas were used to exclude any coal resources, and the weathering surface was used to terminate the shallow coal, and to estimate coal ply sub outcrops positions.

6.4.2 Coal Quality Modelling

Raw coal qualities were modelled for each coal ply with the Minex modelling software. Qualities modelled and reported are: RD (Relative density), CV (Calorific Value), AS (Ash), IM (Inherit Moisture), FC (Fixed carbon), VM (Volatile matter), TS (Total Sulphur) and DAF (Dry Ash Free Volatile). All qualities reported are on an air-dried basis.

Coal product washablities were modelled and reported for 2 different coal products:

- Primary coking coal product at a wash RD of 1.40 with a secondary steam coal product at RD 1.80.

For both the slim and large diameter samples, the coarse coal fraction (<25.0(<12.5) >0.5mm) and fine coal fraction (<0.5 >0.212mm) qualities (that was analysed separately) where composited to a single cumulative analytical dataset for each core size. This combined quality data set, as well as coarse fraction only (phase 1 drilling, no washabailities done on fines) were washed and reported separately for the slim core. Large diameter qualities were washed and reported for the combined coarse and fines dataset only, to report the more realistic expected yield and qualities for the low density coking coal fractions. Note that the large diameter fraction was crushed to -12.5mm, compared to the slim diameter core that was crushed to -25mm as described in section 5.2.4.

The washability modelling was done using the washability module in Minex. Thereafter for each product, each variable were estimated using the Minex gridding system, to enable reporting of these qualities for each ply as defined. For each coal product, the following variables were reported where applicable: PYL (Primary Product Yield), SYL (Secondary Product Yield), CV (Calorific Value), AS (Ash), IM (Inherit Moisture), VM (Volatile matter), TS (Total Sulphur), TP (Phosphorus), SWELL (Free Swelling index) and ROGA (Roga number). All qualities reported are on an air-dried basis.

7. COAL RESOURCE ESTIMATES

7.1 Resource Reporting Code

Coal quantity and quality estimates are reported according to the "Australasian Code for reporting of Exploration Results, Mineral Resources and Ores Reserves" (JORC Code 2012), and supported by the guidelines of the "Australian Guidelines for the Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves" – 2003.

Tonnages are reported in terms of the definitions applied in SANS 10320:2004 as 'Gross in situ coal resources' and 'Total in situ coal resources', the latter being derived from the former by application of a physical geological loss factor. Preliminary physical and coal quality cut-offs have been applied to the reported GTIS tonnage estimation as follows:

- A minimum thickness of 0.50m was excluded for each ply.
- A maximum raw ash value cut-off at 65% was applied to reported coal tonnages.
- All tonnages stated herein are estimates of metric tonnes on an air-dry mass basis.

7.2 Resource Classification

The relationship between Inventory Coal, Coal resources and Coal reserves in terms of the JORC code is shown in the following diagram (Figure 32):

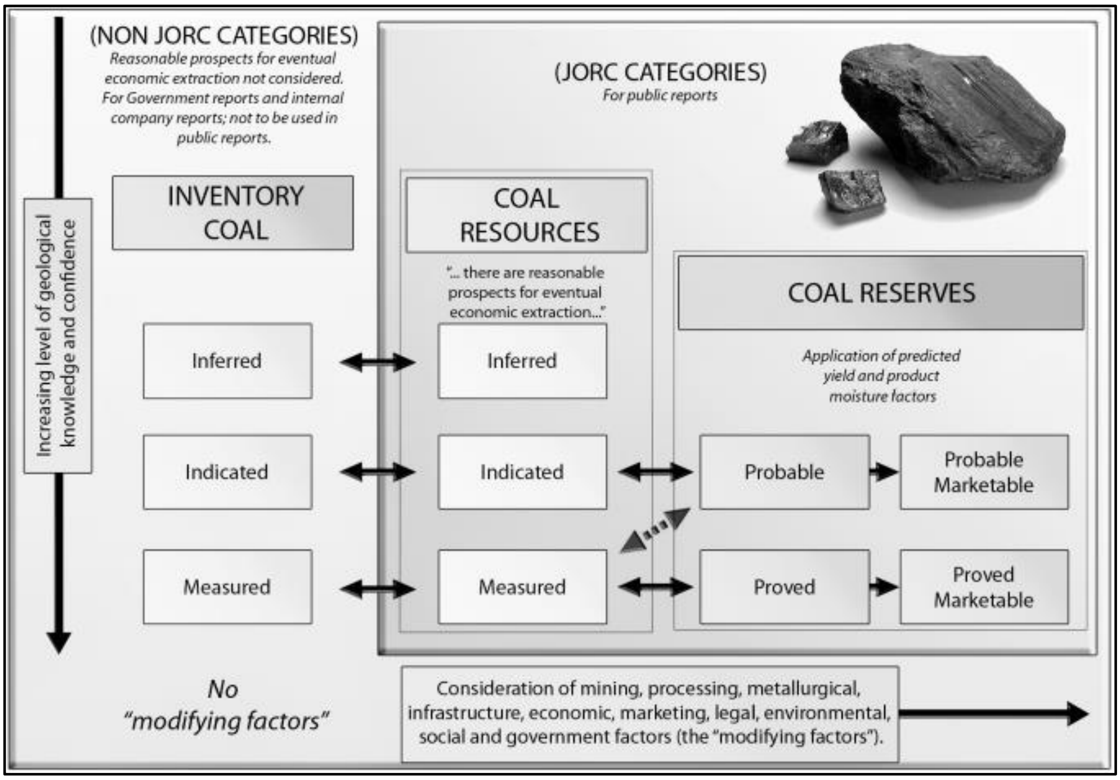

Figure 32: Relationship between inventory coal, coal resources and coal reserves

No geostatistical studies were done to determine the coal classification, as this project was completed prior to 2012 when the updated JORC code came into effect. Therefor the classification is still based on the 2003 Australian guidelines for Coal reporting. Only boreholes where the coal seam was analysed were considered as point observations to be used for resource classification.

Resource classes applied to the resource estimation is based on borehole spacing (between points of observation) as summarised below in Table 7.

Table 7: Resource classification according to borehole density

RESOURCE CLASSIFICATION ACCORDING TO BOREHOLE DENSITY DRILL GRID (m)	AREA (ha)	DRILLHOLES PER 100ha	RESOURCE CLASS
500 x 500	25	4	**Measured**
1000 x 1000	100	1	**Indicated**
4000 x 4000	1600	0.06	**Inferred ***

- ***Note that Gemecs has reported Inferred coal resources only up to 2000m due to structural limitations in the project area.***

Coal resource classification has been done for each separate coal zone ply. In general resource areas are mainly classified as Indicated (60%) and Measured (32%) and only

8% as Inferred, a significant improvement since previous classifications. A plan illustrating the resource classification for the primary S08 Ply is presented below. Red indicates Inferred resource classification, yellow the Indicated resource classification and green the Measured resource classification areas.

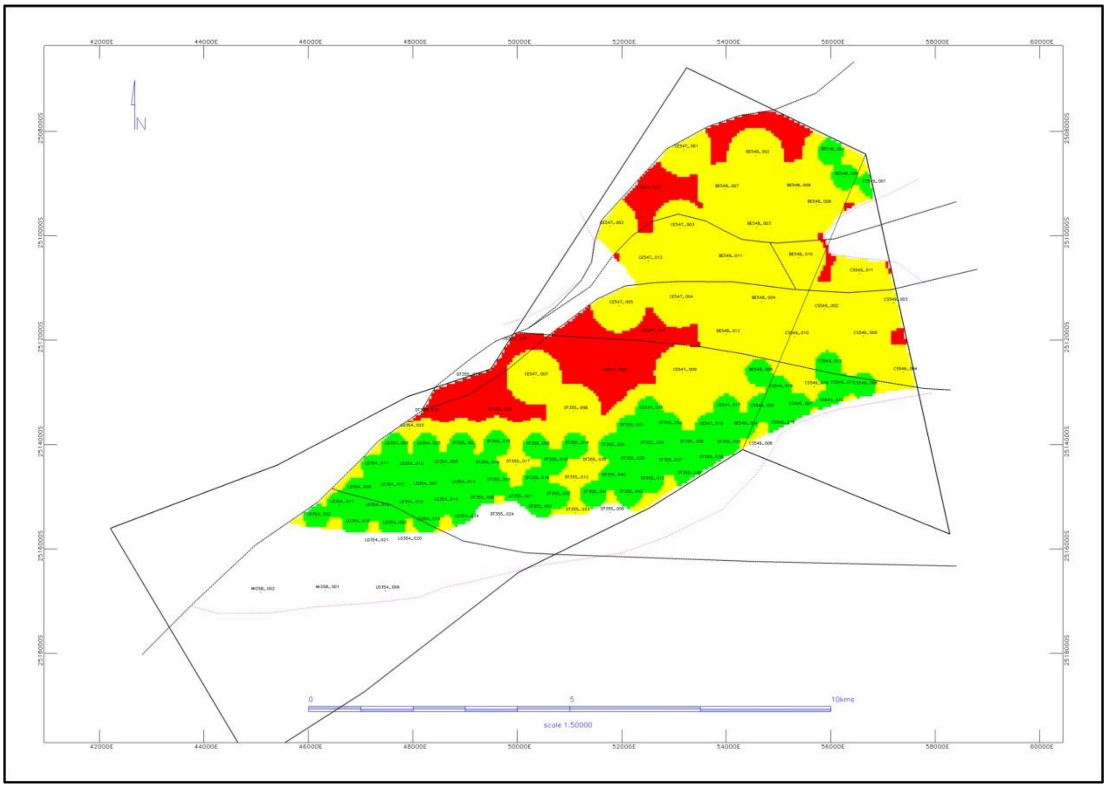

Figure 33: Plan illustrating resource classification for ply S08

7.3 Key Estimation Assumptions and Parameters

The following assumptions apply to this resource estimate:

- The geological interpretation of structure and coal-bearing areas is valid.
- The bottom of the weathering surface was used to cut off any weathered coal.
- Coal resource categories were estimated using representative and sampled coal zones only.
- A discount factor was applied to Gross in situ tonnages (GTIS) to obtain Mineable in situ tonnages (MTIS), to account for geological losses due to geological structure and accuracy of geological interpretation for the property. In the case of resource areas defined as "Inferred" a 20% loss was applied and in the case of resource

areas defined as "Measured" and "Indicated" a 15% loss was applied.

- Inferred coal resources reported up to a drill hole spacing of 2000m only.
- Coal resources were split into potential Opencast and potential Underground resources by applying the following criteria:
    - Opencast areas – Resource areas where the strip ratio is equal or less than 3:1 (cubic metres/tonne). Areas are subdivided by fault boundaries.
    - Underground areas – Resource areas where the strip ratio is more than 3:1 (cubic metres/tonne). Areas are subdivided according to faults boundaries.
- Plies S02, S06, S08, S09, S11, S12, S14, S15 & S18 are regarded as potential contributors to the total coal resource base for this project in terms of opencast mining.
- Potential underground extraction of plies is to be investigated, and all coal plies are reported as coal resources at present.
- A number of strip ratio scenarios were investigated and calculated to determine the various opencast and underground resource blocks. Various coal ply combinations between S02, S06, S08, S09, S11, S12, S14 & S15 were calculated. A plan presenting the strip ratios for a combination of these coal zones is presented in Figure 34.

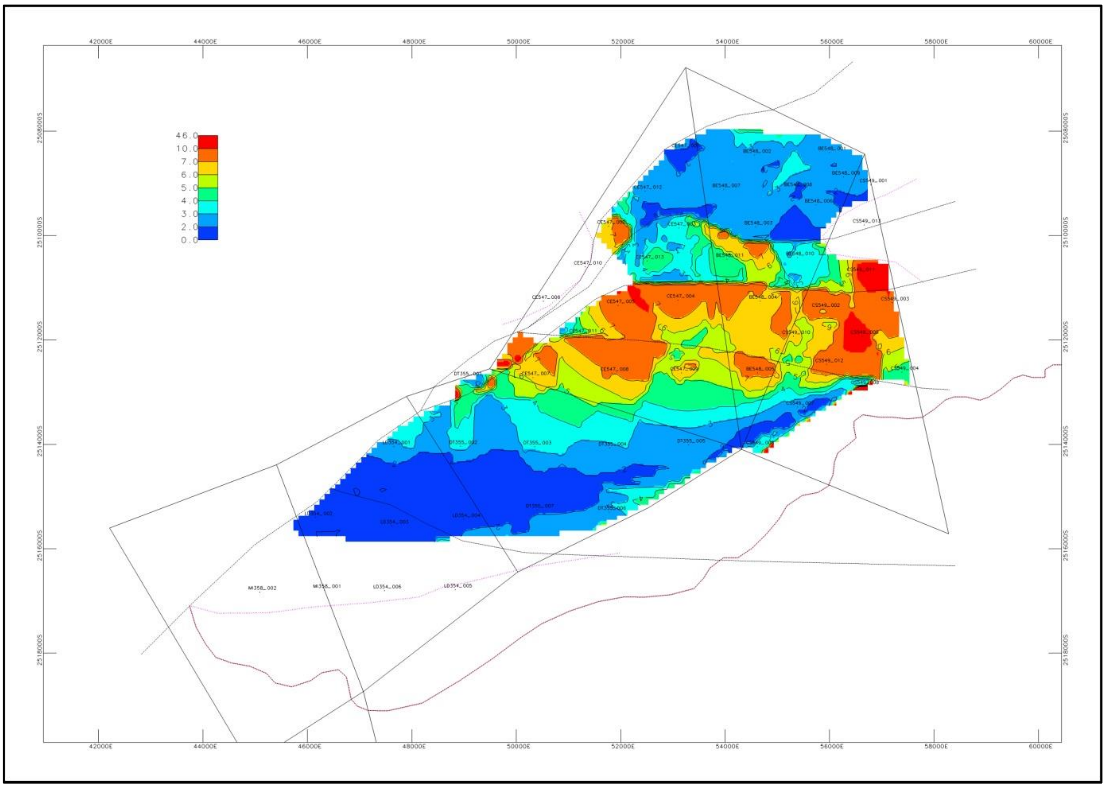

Figure 34: Combined coal ply strip ratio plan

More detailed work would still be required, also incorporating maximum depth below surface cut offs, coal quality cut offs and practical mining considerations before final mineable opencast and underground resource areas can be defined and reported.

7.4 Coal Resource Estimation Reports

In situ coal resources are estimated and reported for the total Berenice Cygnus project area, as well as for selected opencast and underground resource areas. In total 4 potential opencast and 3 underground areas are currently identified based on the assumptions described in the previous section. A plan illustrating this reported coal resource areas are presented in Figure 35 overleaf, where light blue indicates opencast resource areas and dark blue the underground resource areas. The total resource area is limited by the black outline according to the farm boundaries.

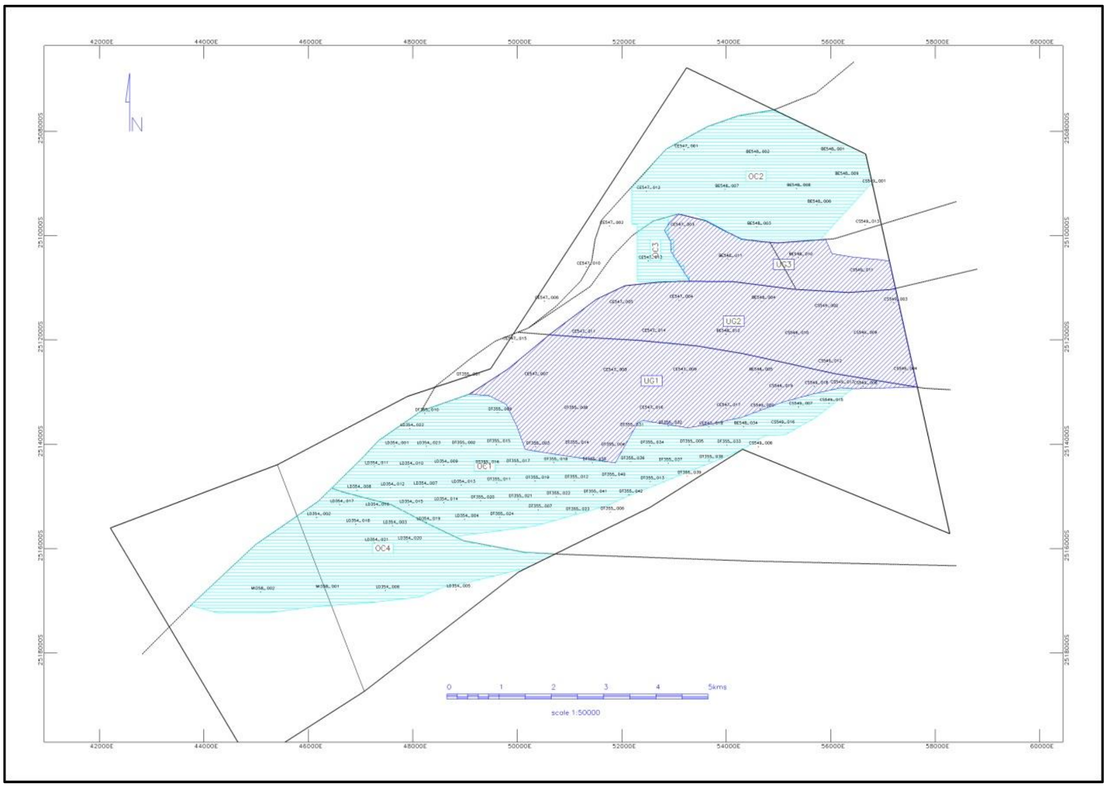

Figure 35: Plan illustrating reported opencast and underground resource areas

No changes are reported compared to previous coal resource statements. Gross in situ coal resources for the total Berenice Cygnus project area is estimated at **1 350.1 million tonnes**, with 424.9 million tonnes classified as Measured, 800.9 million tonnes as Indicated and 124.3 million tonnes as Inferred. Of this total, some 600Mt (after geological losses) may be amenable to exploitation by opencast techniques. For underground areas a total of 503.3Mt (after geological losses) is reported.

The gross in situ tonnes for the farm Cygnus only is estimated at **145.8 million tonnes**, and mineable in situ tonnes estimated at **119.7 million tonnes**. This is inclusive of the coal resources as reported for Berenice, and is only stated separately as it is covered by a separate prospecting licence and JV partner.

Net attributable tonnes based on the 50% interest held by Universal Coal Development II & V is stated at **675.1 million tonnes** gross in situ, and **551.8 million tonnes** mineable in situ.

A summary of the coal resources is presented in the tables overleaf, including a split between the Berenice and Cygnus projects. Further detailed mineable in situ resource tonnage for each of the opencast and underground resource areas is also presented.

Table 8: Gross in situ tonnes per resource category

Resource Category	Gross In Situ Tonnes (Mt)	In Situ Tonnes (Mt) (after geological losses)
Measured	424.9	361.2
Indicated	800.9	680.8
Inferred	124.3	99.4
Total	**1 350.1**	**1 141.4**

Table 9: Mineable in situ tonnes for opencast and underground resource areas

Resource Category	Opencast Mineable In Situ Tonnes (Mt) (after geological losses)	Underground Mineable In Situ Tonnes (Mt) (after geological losses)
Measured	293.7	59.1
Indicated	260.4	399.8
Inferred	46.1	44.4
Total	**600.3**	**503.3**

Table 10. Berenice Cygnus Project – Summary of coal resources by status

Summary of resources by status					
Coal	Gross in situ tonnes		Mineable in situ tonnes		
Category	Gross in situ tonnes	Net Attributable	Mineable in situ tonnes	Net Attributable	Operator
	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	
Measured	424.91	212.46	352.81	176.41	
Indicated	800.9	400.5	660.3	330.2	
Inferred	124.3	62.2	90.5	45.3	
Total	**1 350.1**	**675.1**	**1 103.6**	**551.8**	Universal Coal Development II (Pty) Ltd

*****Includes Cygnus GTIS of 145.8 million tonnes***

*****Includes Cygnus MTIS of 119.7 million tonnes***

Table 11. Berenice project only (Excluding Cygnus) – Summary of coal resources by status

Summary of resources by status					
Coal	Gross in situ tonnes		Mineable in situ tonnes		
Category	Gross in situ tonnes	Net Attributable	Mineable in situ tonnes	Net Attributable	Operator
	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	
Measured	393.96	196.99	328.19	164.10	
Indicated	694.2	347.2	571.7	285.9	
Inferred	116.1	58.1	84.0	42.1	
Total	**1 204.3**	**602.2**	**983.9**	**491.9**	**Universal Coal Development II (Pty) Ltd**

Table 12. Cygnus project only – Summary of coal resources by status

Summary of resources by status					
Coal	Gross in situ tonnes		Mineable in situ tonnes		
Category	Gross in situ tonnes	Net Attributable	Mineable in situ tonnes	Net Attributable	Operator
	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	Tonnes (Mt)	
Measured	30.95	15.47	24.62	12.31	
Indicated	106.7	53.3	88.6	44.3	
Inferred	8.2	4.1	6.5	3.2	
Total	**145.8**	**72.9**	**119.7**	**59.9**	**Universal Coal Development V (Pty) Ltd**

Table 13: Mineable in situ coal resource detail Opencast- OC1 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
OC1	S02	MEASURED	37.639	15%	31.993	3.51	58
OC1	S02	INDICATED	18.688	15%	15.885	3.51	59
OC1	S02	INFERRED	1.843	20%	1.474	3.12	41
	S02		**58.170**	15%	**49.352**	**3.50**	**58**
OC1	S04	MEASURED	3.184	15%	2.706	1.28	68
OC1	S04	INDICATED	0.179	15%	0.152	1.32	67
OC1	S04	INFERRED	0	20%	0		
	S04		**3.363**	15%	**2.859**	**1.28**	**68**
OC1	S06	MEASURED	70.703	15%	60.098	5.27	64
OC1	S06	INDICATED	24.177	15%	20.550	4.55	70
OC1	S06	INFERRED	2.216	20%	1.773	3.72	51
	S06		**97.096**	15%	**82.421**	**5.06**	**65**
OC1	S08	MEASURED	44.769	15%	38.054	3.35	70
OC1	S08	INDICATED	11.497	15%	9.772	3.08	70
OC1	S08	INFERRED	3.030	20%	2.424	2.90	70
	S08		**59.296**	15%	**50.250**	**3.27**	**70**
OC1	S09	MEASURED	36.395	15%	30.936	3.17	72
OC1	S09	INDICATED	12.378	15%	10.521	2.58	68
OC1	S09	INFERRED	0.921	20%	0.737	1.79	79
	S09		**49.694**	15%	**42.194**	**3.00**	**71**
OC1	S11	MEASURED	19.699	15%	16.744	1.77	80
OC1	S11	INDICATED	8.466	15%	7.196	1.53	81
OC1	S11	INFERRED	0.981	20%	0.785	1.33	78
	S11		**29.146**	15%	**24.725**	**1.69**	**80**
OC1	S12	MEASURED	22.289	15%	18.946	1.72	83
OC1	S12	INDICATED	7.884	15%	6.701	1.57	86
OC1	S12	INFERRED	0.406	20%	0.325	1.06	69
	S12		**30.579**	15%	**25.972**	**1.67**	**84**
OC1	S14	MEASURED	40.401	15%	34.341	3.12	82
OC1	S14	INDICATED	17.964	15%	15.269	2.78	89
OC1	S14	INFERRED	2.653	20%	2.122	2.60	90
	S14		**61.018**	15%	**51.733**	**3.00**	**84**
OC1	S15	MEASURED	2.570	15%	2.185	2.61	88
OC1	S15	INDICATED	5.612	15%	4.770	1.32	88
OC1	S15	INFERRED	1.292	20%	1.034	1.52	101
	S15		**9.474**	16%	**7.988**	**1.70**	**90**
OC1	S18	MEASURED	0.318	15%	0.270	2.98	123
OC1	S18	INDICATED	2.895	15%	2.461	2.39	115
OC1	S18	INFERRED	0.502	20%	0.402	2.58	110
	S18		**3.715**	16%	**3.133**	**2.47**	**115**
TOTAL OC1		**MEASURED**	**277.967**		**236.272**	**69.4%**	
TOTAL OC1		**INDICATED**	**109.740**		**93.279**	**27.4%**	
TOTAL OC1		**INFERRED**	**13.844**		**11.075**	**3.3%**	
TOTAL OC1			**401.551**		**340.626**		

Table 14: Mineable in situ coal resource detail Opencast- OC2 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
OC2	S02	MEASURED	0	15%	0		
OC2	S02	INDICATED	3.167	15%	2.692	2.29	48
OC2	S02	INFERRED	0.945	20%	0.756	2.71	34
	S02		**4.112**	16%	**3.448**	**2.39**	**45**
OC2	S04	MEASURED	0	15%	0		
OC2	S04	INDICATED	0	15%	0		
OC2	S04	INFERRED	0	20%	0		
	S04		**0**		**0**		
OC2	S06	MEASURED	2.759	15%	2.345	3.04	36
OC2	S06	INDICATED	31.222	15%	26.539	2.96	50
OC2	S06	INFERRED	8.238	20%	6.590	3.11	59
	S06		**42.219**	16%	**35.474**	**2.99**	**51**
OC2	S08	MEASURED	4.292	15%	3.648	5.15	41
OC2	S08	INDICATED	43.149	15%	36.677	4.39	53
OC2	S08	INFERRED	10.004	20%	8.003	4.21	63
	S08		**57.445**	16%	**48.328**	**4.42**	**54**
OC2	S09	MEASURED	0	15%	0	0	
OC2	S09	INDICATED	5.730	15%	4.871	2.33	70
OC2	S09	INFERRED	0.013	20%	0.010	2.64	74
	S09		**5.743**	15%	**4.881**	**2.33**	**70**
OC2	S11	MEASURED	0.932	15%	0.792	2.41	54
OC2	S11	INDICATED	13.319	15%	11.321	2.74	79
OC2	S11	INFERRED	1.669	20%	1.335	2.79	71
	S11		**15.920**	16%	**13.449**	**2.73**	**77**
OC2	S12	MEASURED	1.207	15%	1.026	1.46	59
OC2	S12	INDICATED	15.704	15%	13.348	1.65	70
OC2	S12	INFERRED	3.162	20%	2.530	1.36	81
	S12		**20.073**	16%	**16.904**	**1.59**	**71**
OC2	S14	MEASURED	0	15%	0	0	
OC2	S14	INDICATED	22.945	15%	19.503	3.12	83
OC2	S14	INFERRED	2.736	20%	2.189	2.67	82
	S14		**25.681**	16%	**21.692**	**3.07**	**83**
OC2	S15	MEASURED	0	15%	0	0	
OC2	S15	INDICATED	0.295	15%	0.251	1.27	81
OC2	S15	INFERRED	0.004	20%	0.003	0.79	67
	S15		**0.299**	15%	**0.254**	**1.26**	**81**
OC2	S18	MEASURED	0	15%	0		
OC2	S18	INDICATED	0	15%	0		
OC2	S18	INFERRED	0	20%	0		
	S18		**0**		**0**		
TOTAL OC2		**MEASURED**	**9.190**		**7.812**	**5.4%**	
TOTAL OC2		**INDICATED**	**135.531**		**115.201**	**79.8%**	
TOTAL OC2		**INFERRED**	**26.771**		**21.417**	**14.8%**	
TOTAL OC2			**171.492**		**144.430**		

Table 15: Mineable in situ coal resource detail Opencast- OC3 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
OC3	S02	MEASURED	0	15%	0		
OC3	S02	INDICATED	1.614	15%	1.372	3.17	112
OC3	S02	INFERRED	0	20%	0		
	S02		**1.614**	15%	**1.372**	**3.13**	**112**
OC3	S04	MEASURED	0	15%	0		
OC3	S04	INDICATED	0	15%	0		
OC3	S04	INFERRED	0	20%	0		
	S04		**0**		**0**		
OC3	S06	MEASURED	0	15%	0		
OC3	S06	INDICATED	4.534	15%	3.854	3.09	91
OC3	S06	INFERRED	0.240	20%	0.192	3.20	59
	S06		**4.774**	15%	**4.046**	**3.10**	**89**
OC3	S08	MEASURED	0	15%	0		
OC3	S08	INDICATED	5.501	15%	4.676	3.87	96
OC3	S08	INFERRED	0.296	20%	0.237	4.19	65
	S08		**5.797**	15%	**4.913**	**3.89**	**94**
OC3	S09	MEASURED	0	15%	0		
OC3	S09	INDICATED	1.355	15%	1.152	2.71	71
OC3	S09	INFERRED	0	20%	0		
	S09		**1.355**	15%	**1.152**	**2.71**	**71**
OC3	S11	MEASURED	0	15%	0		
OC3	S11	INDICATED	1.878	15%	1.596	2.95	117
OC3	S11	INFERRED	0.017	20%	0.014	3.20	161
	S11		**1.895**	15%	**1.610**	**2.95**	**117**
OC3	S12	MEASURED	0	15%	0		
OC3	S12	INDICATED	0.746	15%	0.634	0.77	117
OC3	S12	INFERRED	0.058	20%	0.046	0.71	122
	S12		**0.804**	15%	**0.681**	**0.77**	**117**
OC3	S14	MEASURED	0	15%	0		
OC3	S14	INDICATED	4.767	15%	4.052	3.02	107
OC3	S14	INFERRED	0.108	20%	0.086	2.27	158
	S14		**4.875**	15%	**4.138**	**3.00**	**108**
OC3	S15	MEASURED	0	15%	0		
OC3	S15	INDICATED	0	15%	0		
OC3	S15	INFERRED	0	20%	0		
	S15		**0**		**0**		
OC3	S18	MEASURED	0	15%	0		
OC3	S18	INDICATED	0	15%	0		
OC3	S18	INFERRED	0	20%	0		
	S18		**0**		**0**		
TOTAL OC3		**MEASURED**	**0**		**0**	**0.0%**	
TOTAL OC3		**INDICATED**	**20.395**		**17.336**	**96.8%**	
TOTAL OC3		**INFERRED**	**0.719**		**0.575**	**3.2%**	
TOTAL OC3			**21.114**		**17.911**		

Table 16: Mineable in situ coal resource detail Opencast- OC4 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
OC4	S02	MEASURED	5.587	15%	4.749	3.49	45
OC4	S02	INDICATED	2.794	15%	2.375	3.32	35
OC4	S02	INFERRED	0	20%	0		
	S02		**8.381**	15%	**7.129**	**3.43**	**42**
OC4	S04	MEASURED	0	15%	0		
OC4	S04	INDICATED	0	15%	0		
OC4	S04	INFERRED	0	20%	0		
	S04		**0**		**0**		
OC4	S06	MEASURED	12.554	15%	10.671	5.97	52
OC4	S06	INDICATED	4.828	15%	4.104	5.84	45
OC4	S06	INFERRED	0	20%	0		
	S06		**17.382**	15%	**14.775**	**5.93**	**50**
OC4	S08	MEASURED	6.471	15%	5.500	3.49	58
OC4	S08	INDICATED	1.384	15%	1.176	3.43	53
OC4	S08	INFERRED	0	20%	0		
	S08		**7.855**	15%	**6.677**	**3.48**	**57**
OC4	S09	MEASURED	6.700	15%	5.695	2.64	61
OC4	S09	INDICATED	0.934	15%	0.794	2.41	54
OC4	S09	INFERRED	0	20%	0		
	S09		**7.634**	15%	**6.489**	**2.61**	**60**
OC4	S11	MEASURED	3.124	15%	2.655	1.64	61
OC4	S11	INDICATED	0.396	15%	0.337	1.71	50
OC4	S11	INFERRED	0	20%	0		
	S11		**3.520**	15%	**2.992**	**1.65**	**60**
OC4	S12	MEASURED	5.681	15%	4.829	1.95	68
OC4	S12	INDICATED	2.276	15%	1.935	1.98	57
OC4	S12	INFERRED	0.083	20%	0.066	2.19	53
	S12		**8.040**	15%	**6.830**	**1.96**	**65**
OC4	S14	MEASURED	10.319	15%	8.771	3.57	71
OC4	S14	INDICATED	3.658	15%	3.109	3.25	61
OC4	S14	INFERRED	0.062	20%	0.050	2.51	58
	S14		**14.039**	15%	**11.930**	**3.48**	**68**
OC4	S15	MEASURED	0	15%	0		
OC4	S15	INDICATED	3.863	15%	3.284	3.02	82
OC4	S15	INFERRED	0.009	20%	0.007	0.59	93
	S15		**3.872**	15%	**3.291**	**3.01**	**82**
OC4	S18	MEASURED	7.966	15%	6.771	4.88	108
OC4	S18	INDICATED	20.567	15%	17.482	4.61	78
OC4	S18	INFERRED	16.196	20%	12.957	5.71	71
	S18		**44.729**	17%	**37.210**	**5.06**	**81**
TOTAL OC4		**MEASURED**	**58.402**		**49.642**	**51.0%**	
TOTAL OC4		**INDICATED**	**40.700**		**34.595**	**35.5%**	
TOTAL OC4		**INFERRED**	**16.350**		**13.080**	**13.4%**	
TOTAL OC4			**115.452**		**97.317**		

Table 17: Mineable in situ coal resource detail Underground- UG1 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
UG1	S02	MEASURED	14.365	15%	12.210	3.52	92
UG1	S02	INDICATED	40.087	15%	34.074	3.40	122
UG1	S02	INFERRED	2.894	20%	2.315	3.48	97
	S02		**57.346**	15%	**48.599**	**3.43**	**113**
UG1	S04	MEASURED	1.950	15%	1.658	0.94	103
UG1	S04	INDICATED	3.850	15%	3.273	1.54	125
UG1	S04	INFERRED	0	20%	0		
	S04		**5.800**	15%	**4.930**	**1.34**	**118**
UG1	S06	MEASURED	17.047	15%	14.490	4.06	102
UG1	S06	INDICATED	54.292	15%	46.148	4.27	122
UG1	S06	INFERRED	6.094	20%	4.875	3.85	129
	S06		**77.433**	15%	**65.513**	**4.19**	**118**
UG1	S08	MEASURED	12.211	15%	10.379	3.39	105
UG1	S08	INDICATED	30.037	15%	25.531	3.37	131
UG1	S08	INFERRED	14.871	20%	11.897	3.36	133
	S08		**57.119**	16%	**47.808**	**3.37**	**126**
UG1	S09	MEASURED	5.161	15%	4.387	2.18	103
UG1	S09	INDICATED	15.687	15%	13.334	2.58	144
UG1	S09	INFERRED	1.484	20%	1.187	1.49	174
	S09		**22.332**	15%	**18.908**	**2.42**	**137**
UG1	S11	MEASURED	4.111	15%	3.494	1.73	119
UG1	S11	INDICATED	15.684	15%	13.331	1.86	140
UG1	S11	INFERRED	2.043	20%	1.634	2.03	154
	S11		**21.838**	15%	**18.460**	**1.85**	**137**
UG1	S12	MEASURED	4.796	15%	4.077	1.56	120
UG1	S12	INDICATED	20.933	15%	17.793	1.68	145
UG1	S12	INFERRED	1.256	20%	1.005	1.80	124
	S12		**26.985**	15%	**22.874**	**1.66**	**140**
UG1	S14	MEASURED	6.531	15%	5.551	2.77	114
UG1	S14	INDICATED	17.209	15%	14.628	2.85	165
UG1	S14	INFERRED	3.960	20%	3.168	2.15	143
	S14		**27.700**	16%	**23.347**	**2.73**	**150**
UG1	S15	MEASURED	0.628	15%	0.534	3.69	109
UG1	S15	INDICATED	3.529	15%	3.000	2.20	124
UG1	S15	INFERRED	0.438	20%	0.350	1.19	146
	S15		**4.595**	15%	**3.884**	**2.31**	**124**
UG1	S18	MEASURED	0	15%	0		
UG1	S18	INDICATED	0	15%	0		
UG1	S18	INFERRED	0	20%	0		
	S18		**0**		**0**		
TOTAL UG1		**MEASURED**	**66.800**		**56.780**	**22.3%**	
TOTAL UG1		**INDICATED**	**201.308**		**171.112**	**67.3%**	
TOTAL UG1		**INFERRED**	**33.040**		**26.432**	**10.4%**	
TOTAL UG1			**301.148**		**254.324**		

Table 18: Mineable in situ coal resource detail Underground- UG2 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
UG2	S02	MEASURED	0.075	15%	0.064	3.38	94
UG2	S02	INDICATED	41.360	15%	35.156	3.18	156
UG2	S02	INFERRED	0.964	20%	0.771	3.54	92
	S02		**42.399**	15%	**35.991**	**3.19**	**154**
UG2	S04	MEASURED	0.068	15%	0.058	1.56	102
UG2	S04	INDICATED	0.404	15%	0.343	1.62	104
UG2	S04	INFERRED	0.021	20%	0.017	1.54	57
	S04		**0.493**	15%	**0.418**	**1.61**	**102**
UG2	S06	MEASURED	1.088	15%	0.925	2.85	111
UG2	S06	INDICATED	46.688	15%	39.685	3.48	167
UG2	S06	INFERRED	3.497	20%	2.798	2.93	185
	S06		**51.273**	15%	**43.407**	**3.43**	**167**
UG2	S08	MEASURED	0.846	15%	0.719	2.49	114
UG2	S08	INDICATED	39.491	15%	33.567	3.10	176
UG2	S08	INFERRED	3.645	20%	2.916	2.20	162
	S08		**43.982**	15%	**37.202**	**3.01**	**174**
UG2	S09	MEASURED	0.080	15%	0.068	1.38	71
UG2	S09	INDICATED	1.801	15%	1.531	1.20	175
UG2	S09	INFERRED	1.706	20%	1.365	1.36	191
	S09		**3.587**	17%	**2.964**	**1.28**	**180**
UG2	S11	MEASURED	0	15%	0		
UG2	S11	INDICATED	11.506	15%	9.780	1.88	183
UG2	S11	INFERRED	1.414	20%	1.131	2.20	208
	S11		**12.920**	16%	**10.911**	**1.92**	**186**
UG2	S12	MEASURED	0	15%	0		
UG2	S12	INDICATED	19.093	15%	16.229	1.70	194
UG2	S12	INFERRED	2.747	20%	2.198	1.44	195
	S12		**21.840**	16%	**18.427**	**1.67**	**194**
UG2	S14	MEASURED	0.552	15%	0.469	1.71	137
UG2	S14	INDICATED	17.195	15%	14.616	2.51	206
UG2	S14	INFERRED	0.740	20%	0.592	1.84	204
	S14		**18.487**	15%	**15.677**	**2.46**	**204**
UG2	S15	MEASURED	0	15%	0		
UG2	S15	INDICATED	2.004	15%	1.703	1.67	178
UG2	S15	INFERRED	0.323	20%	0.258	1.72	184
	S15		**2.327**	16%	**1.962**	**1.68**	**179**
UG2	S18	MEASURED	0	15%	0		
UG2	S18	INDICATED	0	15%	0		
UG2	S18	INFERRED	0	20%	0		
	S18		**0**		**0**		
TOTAL UG2		**MEASURED**	**2.709**		**2.303**	**1.4%**	
TOTAL UG2		**INDICATED**	**179.542**		**152.611**	**91.4%**	
TOTAL UG2		**INFERRED**	**15.057**		**12.046**	**7.2%**	
TOTAL UG2			**197.308**		**166.959**		

Table 19: Mineable in situ coal resource detail Underground- UG3 Area

Resource Area Name	COAL PLY	Resource CLASS	Gross In situ Tonnes (Mt)	Geological Loss (%)	Mineable In situ Tonnes (Mt)	Ply Thickness (m)	Average Depth Below Surface (m)
UG3	S02	MEASURED	0	15%	0		
UG3	S02	INDICATED	17.675	15%	15.024	3.51	121
UG3	S02	INFERRED	0.774	20%	0.619	3.59	125
	S02		**18.449**	15%	**15.643**	**3.51**	**121**
UG3	S04	MEASURED	0	15%	0		
UG3	S04	INDICATED	0	15%	0		
UG3	S04	INFERRED	0	20%	0		
	S04		**0**		**0**		
UG3	S06	MEASURED	0	15%	0		
UG3	S06	INDICATED	20.904	15%	17.768	3.12	124
UG3	S06	INFERRED	0.711	20%	0.569	2.92	133
	S06		**21.615**	15%	**18.337**	**3.11**	**124**
UG3	S08	MEASURED	0	15%	0		
UG3	S08	INDICATED	27.284	15%	23.191	4.24	126
UG3	S08	INFERRED	0.999	20%	0.799	4.22	137
	S08		**28.283**	15%	**23.991**	**4.24**	**126**
UG3	S09	MEASURED	0	15%	0		
UG3	S09	INDICATED	2.850	15%	2.423	2.22	133
UG3	S09	INFERRED	0.207	20%	0.166	2.10	169
	S09		**3.057**	15%	**2.588**	**2.21**	**135**
UG3	S11	MEASURED	0	15%	0		
UG3	S11	INDICATED	4.632	15%	3.937	2.05	137
UG3	S11	INFERRED	0.508	20%	0.406	2.14	147
	S11		**5.140**	15%	**4.344**	**2.06**	**138**
UG3	S12	MEASURED	0	15%	0		
UG3	S12	INDICATED	9.153	15%	7.780	2.39	142
UG3	S12	INFERRED	2.002	20%	1.602	1.24	157
	S12		**11.155**	16%	**9.382**	**2.18**	**145**
UG3	S14	MEASURED	0	15%	0		
UG3	S14	INDICATED	7.056	15%	5.998	3.14	147
UG3	S14	INFERRED	2.196	20%	1.757	2.29	151
	S14		**9.252**	16%	**7.754**	**2.94**	**148**
UG3	S15	MEASURED	0	15%	0		
UG3	S15	INDICATED	0	15%	0		
UG3	S15	INFERRED	0	20%	0		
	S15		**0**		**0**		
UG3	S18	MEASURED	0	15%	0	0	
UG3	S18	INDICATED	0	15%	0	0	
UG3	S18	INFERRED	0	20%	0	0	
	S18		**0**		**0**		
TOTAL UG3		**MEASURED**	**0**		**0**	**0.0%**	
TOTAL UG3		**INDICATED**	**89.554**		**76.121**	**92.8%**	
TOTAL UG3		**INFERRED**	**7.397**		**5.918**	**7.2%**	
TOTAL UG3			**96.951**		**82.039**		

8. COAL QUALITIES AND PROPERTIES

8.1 Berenice Cygnus Coal Qualities and Products

8.1.1 Slim Diameter Quality Data

All slim diameter coal samples were washed at various density fractions and analysed as described in Section 4 and yields and qualities were calculated for the following products (Excludes fines in products):

- A primary coking coal product at a cumulative F1.40 density – this is deemed to be representative of the coking coal most likely to be produced at Berenice
- a secondary thermal coal product at RD1.80, i.e. cumulative F1.45-F1.80

The coal at the Berenice Cygnus project is typically bright and vitrinite-rich, with high volatile matter, moderate sulphur, low inherent moisture and low phosphorous content.

The low density fraction (CF1.40 g/cm3) of all the coal plies exhibit coking characteristics with high Free Swelling Indices (FSI 4.1-9.0) and ROGA (40-86) Indices. In general Ply S08 contains the highest proportion of coal and also yields the highest proportion of coking coal, followed closely by Ply S06 and S12.

The FSI of the coking coal decreases from east (FSI: 8-9) to west (FSI: 3-6) across the resource area (Figures 36 & 38 overleaf), possibly as a consequence of the coal zones being generally shallower (refer to Figure 13) and weathering more pronounced (refer to Figure 21) towards the west. The primary product yield of each ply, as illustrated in Figures 37 & 39, can be variable over short distances. Opencast Area 1 (the Southern Open Cast Resource Area) generally yields more coking coal than Opencast Area 2 (the Northern Open Cast Resource Area), but at a lower FSI (refer to Tables 20 & 21).

The combined (primary coking coal plus secondary thermal coal) average theoretical coal yield obtained from the slim diameter drilling for the S02, S04, S06, S08, S09, S11, S12, S14 and S15 plies over the entire project area averages between 27% to 54%, of which the primary coking coal product yield is between 7-20% and the middling product yield varies between 20-38%.

The primary and secondary coal yields and qualities from slim diameter samples excluding fines per ply for the opencast and underground areas for the Berenice Cygnus project are presented in Tables 20-26, overleaf.

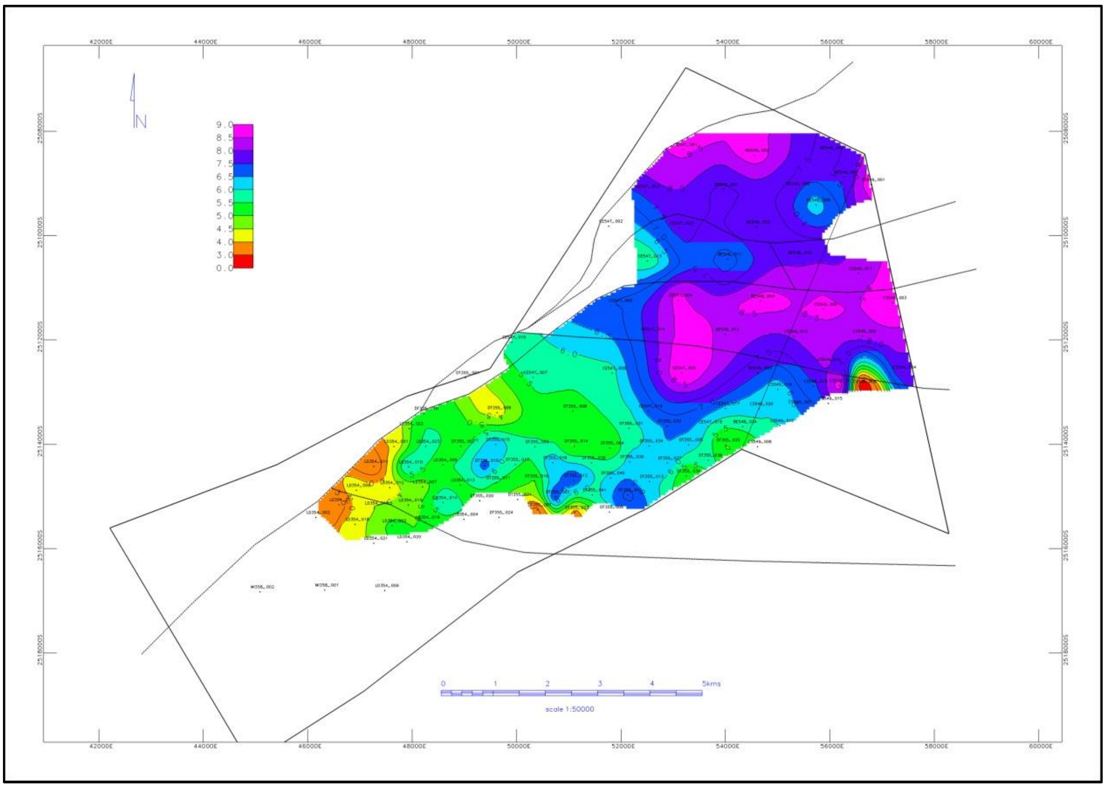

Figure 36: Free swelling indices variation within the coking coal fraction of ply S06 across the Berenice Cygnus project area

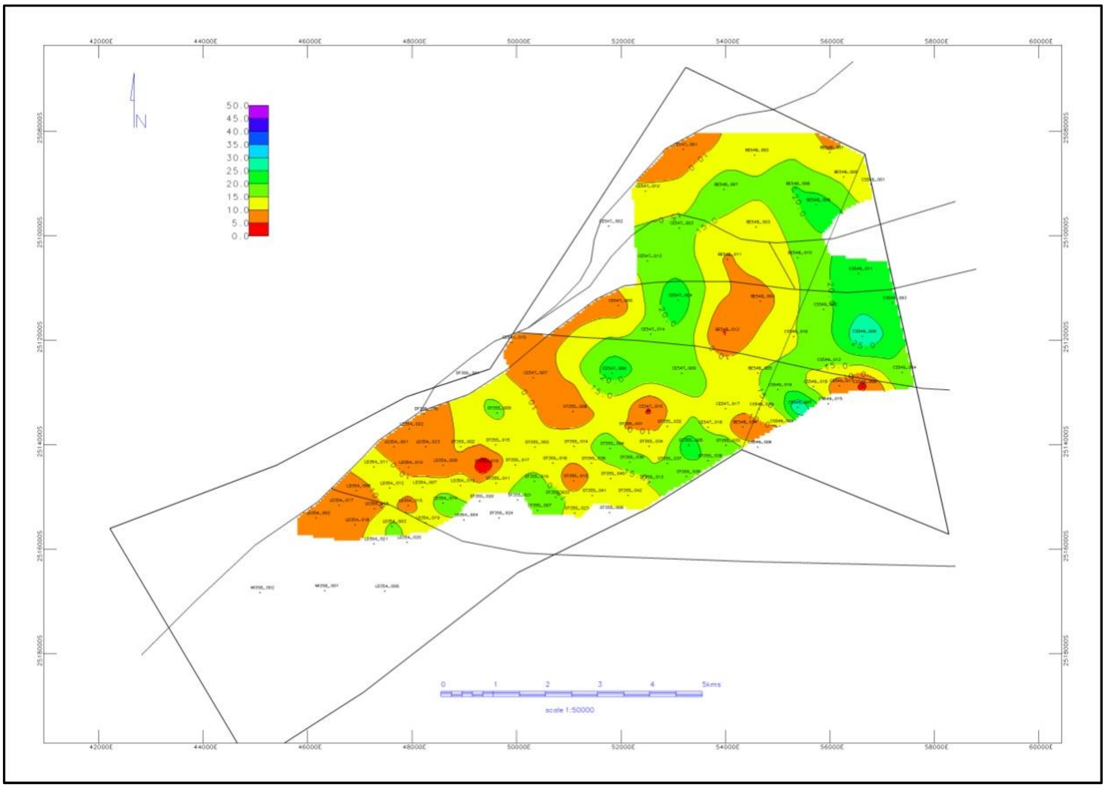

Figure 37: Coking coal yield variation (slim core) for ply S06 across the Berenice Cygnus project area

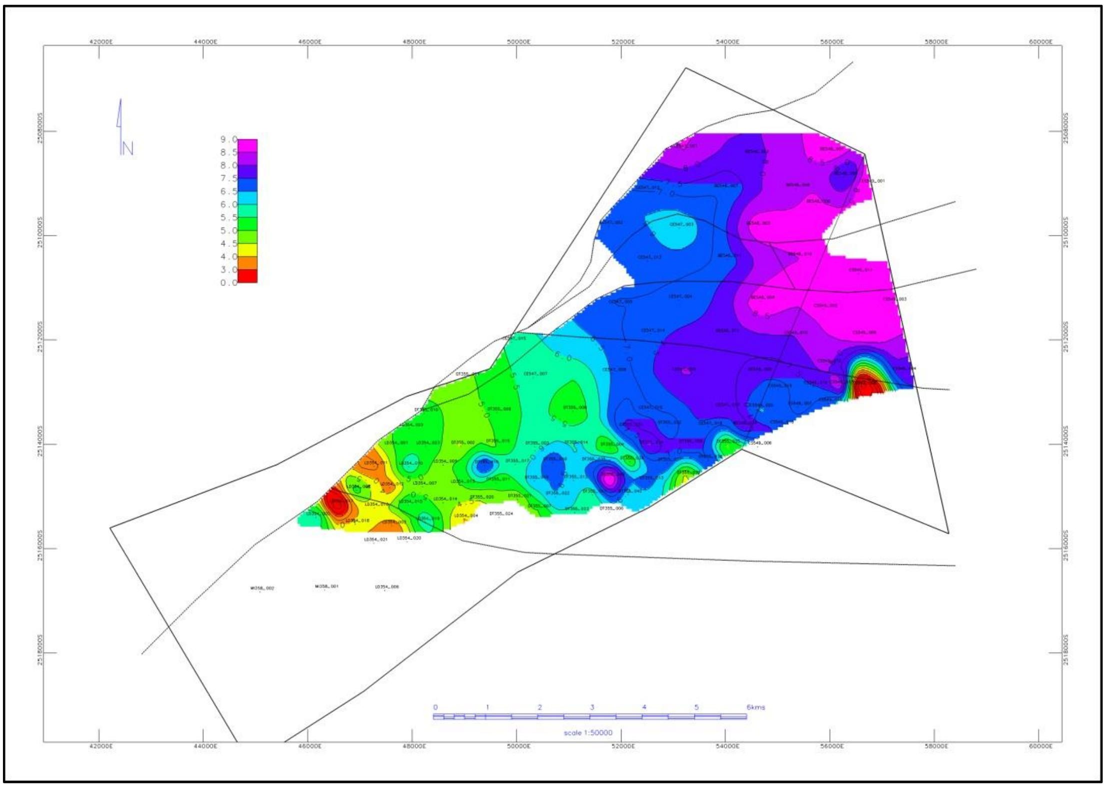

Figure 38: Free swelling indices variation within the coking coal fraction of ply S08 across the Berenice Cygnus project area

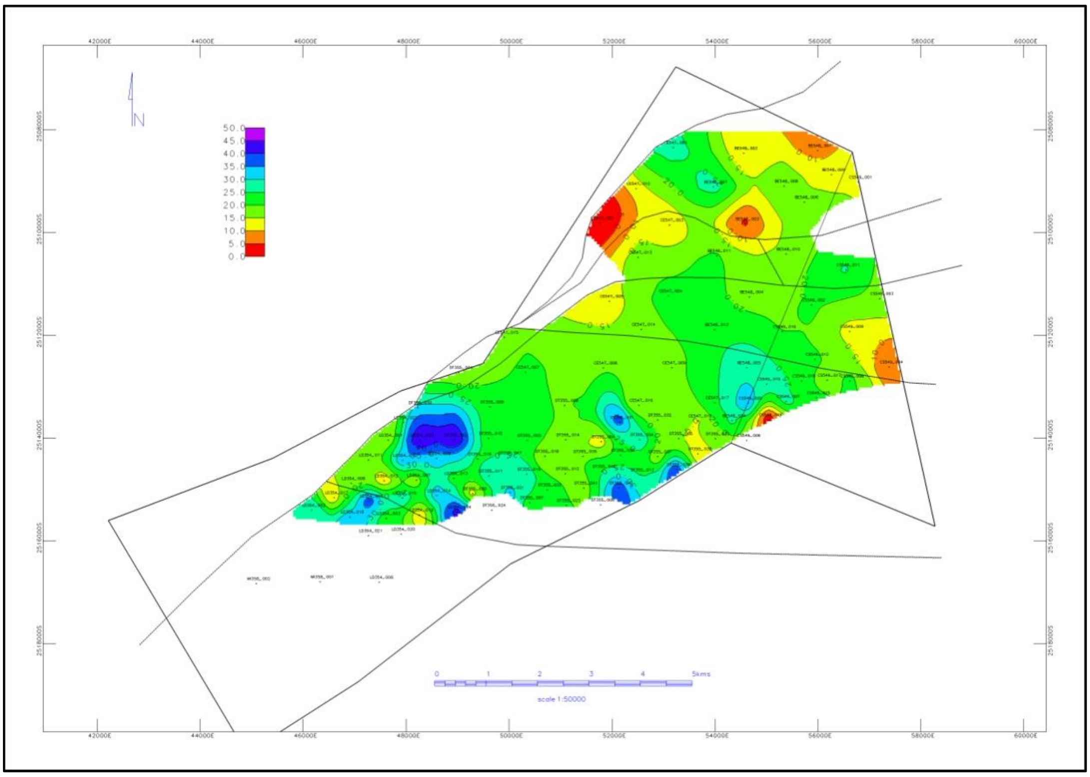

Figure 39: Coking coal yield variation (slim core) for ply S08 across the Berenice Cygnus project area

Table 20: Opencast (OC1) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
OC1	S02	49.352	3.50	8.9	29.6	11.4	35.5	2.3	1.04	0.005	5.5	60		28.4	21.8	32.0	28.8	2.1	1.22	37.3
OC1	S04	2.859	1.28	7.9	29.5	12.1	35.0	2.2	1.05	0.009	6.0	54		36.6	21.4	33.7	28.3	2.0	1.60	44.5
OC1	S06	82.421	5.06	12.0	29.4	11.8	35.5	2.2	0.94	0.006	5.5	51		23.7	22.4	30.1	29.0	2.1	1.30	35.7
OC1	S08	50.250	3.27	24.0	29.7	11.4	36.2	2.2	1.10	0.006	5.5	46		35.0	22.4	30.4	28.9	2.0	1.57	59.1
OC1	S09	42.194	3.00	7.2	29.5	11.6	35.0	2.3	0.90	0.009	6.0	55		21.2	22.3	29.5	29.7	2.1	1.11	28.4
OC1	S11	24.725	1.69	10.2	29.7	10.6	34.5	2.3	0.96	0.009	6.0	40		34.3	22.4	29.5	29.7	2.0	0.97	44.5
OC1	S12	25.972	1.67	12.7	30.2	9.4	34.6	2.3	0.89	0.014	6.0	47		38.4	22.2	29.7	29.7	1.9	0.87	51.1
OC1	S14	51.733	3.00	8.5	30.2	9.7	34.4	2.3	1.03	0.022	5.5	48		27.3	22.5	28.9	29.8	2.0	1.02	35.8
OC1	S15	7.988	1.70	7.8	30.1	10.2	34.2	2.2	1.13	0.036	7.0	65		20.4	23.1	27.4	30.5	1.8	1.27	28.2
OC1	S18	3.133	2.47	0.0										26.2	19.0	37.6	18.5	2.0	0.23	26.2
TOTAL OC1		340.626																		

Table 21: Opencast (OC2) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
OC2	S02	3.448	2.39	6.5	29.5	13.3	34.7	2.0	1.21	0.007	8.0	82		26.8	21.6	33.8	27.1	2.1	1.91	33.3
OC2	S04	0																		
OC2	S06	35.474	2.99	14.0	29.4	13.2	34.5	2.0	0.99	0.011	7.5	79		24.6	22.5	30.9	28.0	1.9	1.37	38.6
OC2	S08	48.328	4.42	15.6	30.0	11.9	35.3	1.6	1.01	0.010	8.0	82		34.6	23.6	28.7	28.7	1.6	1.56	50.1
OC2	S09	4.881	2.33	6.2	30.1	11.3	35.6	2.1	0.94	0.011	8.0	79		19.4	22.6	29.4	30.0	2.0	1.25	25.6
OC2	S11	13.449	2.73	3.0	30.2	10.4	34.4	2.1	0.93	0.012	8.0	81		24.7	20.9	32.4	27.8	1.8	1.13	27.7
OC2	S12	16.904	1.59	10.3	30.1	11.3	33.7	2.0	1.00	0.025	8.5	78		32.3	22.1	31.1	27.8	1.7	1.25	42.6
OC2	S14	21.692	3.07	4.9	30.7	8.9	34.8	2.1	1.17	0.017	8.5	83		23.9	22.3	30.1	29.7	1.7	1.39	28.8
OC2	S15	0.254	1.26	0.6	32.8	4.3	34.3	1.9	0.70	0.019	9.0	86		5.1	23.2	27.8	31.8	1.3	0.76	5.7
OC2	S18	0																		
TOTAL OC2		144.430																		

Table 22: Opencast (OC3) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
OC3	S02	1.372	3.13	8.0	29.9	11.0	35.6	2.2	0.97	0.006	7.0	80		27.0	22.1	32.8	28.1	1.9	1.50	35.0
OC3	S04	0																		
OC3	S06	4.046	3.10	16.5	29.2	13.0	35.7	2.2	0.93	0.009	6.5	80		26.3	21.5	32.5	27.8	2.1	1.39	42.8
OC3	S08	4.913	3.89	15.4	29.7	11.7	36.4	2.0	1.04	0.009	6.5	82		30.7	23.6	28.1	29.6	1.9	1.70	46.1
OC3	S09	1.152	2.71	9.5	30.5	9.1	36.3	2.2	1.17	0.012	6.5	76		16.8	22.1	30.3	29.5	1.9	1.28	26.3
OC3	S11	1.610	2.95	3.5	30.2	10.1	34.0	2.2	0.94	0.015	7.5	78		20.4	21.0	33.0	28.1	1.8	0.86	23.9
OC3	S12	0.681	0.77	20.8	29.8	11.5	35.6	2.1	0.87	0.021	8.0	79		51.5	23.0	28.4	31.9	1.7	0.78	72.3
OC3	S14	4.138	3.00	3.9	30.6	9.7	35.2	2.2	1.11	0.019	7.5	75		24.7	21.0	34.1	28.1	1.8	0.93	28.6
OC3	S15	0																		
OC3	S18	0																		
TOTAL OC3		17.911																		

Table 23: Opencast (OC4) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
OC4	S02	7.124	3.43	9.9	28.9	12.2	34.9	3.0	1.00		4.5	45		27.2	22.3	30.0	29.2	2.5	1.19	37.1
OC4	S04	0																		
OC4	S06	14.775	5.93	9.8	29.4	11.4	36.1	2.6	0.89	0.007	4.0	54		24.7	22.7	28.5	29.9	2.4	1.23	34.5
OC4	S08	6.677	3.48	24.4	29.3	11.6	36.4	2.5	1.12	0.010	4.0	68		35.1	22.0	30.5	29.7	2.4	1.29	59.5
OC4	S09	6.489	2.61	8.1	29.4	11.0	35.7	2.8	0.92	0.011	4.5	59		20.0	22.6	27.9	29.5	2.3	0.88	28.0
OC4	S11	2.992	1.65	7.0	28.9	12.1	34.9	2.6	0.92	0.009	5.0	49		24.7	22.2	28.4	29.1	2.3	0.64	31.7
OC4	S12	6.830	1.96	7.8	29.9	9.5	35.3	2.6	0.86	0.010	5.0	56		33.9	21.7	30.6	29.6	2.1	0.72	41.7
OC4	S14	11.930	3.48	8.8	29.8	9.8	35.5	2.4	0.85	0.039	4.5	44		27.1	23.4	25.9	32.1	2.0	0.84	35.9
OC4	S15	3.291	3.01	4.8	30.3	8.1	35.2	2.6	1.13	0.065	5.0	71		17.8	23.1	26.3	31.7	2.3	1.05	22.6
OC4	S18	37.210	5.06	0.0										35.1	20.1	32.9	20.2	2.5	0.19	35.1
TOTAL OC4		97.317																		

Table 24: Underground (UG1) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
UG1	S02	48.599	3.43	8.4	29.6	12.5	35.5	1.9	1.07	0.006	6.0	69		27.4	21.9	32.7	28.6	1.8	1.33	35.7
UG1	S04	4.930	1.34	9.0	30.1	11.4	34.9	2.0	1.06	0.011	6.0	59		38.9	21.4	34.1	28.3	1.7	1.88	47.9
UG1	S06	65.513	4.19	12.7	29.4	12.6	35.8	2.0	1.03	0.007	6.0	68		25.3	22.5	30.0	29.4	1.8	1.52	38.0
UG1	S08	47.808	3.37	20.6	29.8	11.7	36.1	2.0	1.10	0.007	6.5	57		35.7	22.7	30.0	29.0	1.9	1.76	56.3
UG1	S09	18.908	2.42	6.4	29.8	11.9	34.6	2.0	0.99	0.011	7.0	65		19.9	21.7	31.9	28.5	1.7	1.15	26.3
UG1	S11	18.460	1.85	8.0	30.1	10.7	34.6	1.9	1.08	0.016	6.5	61		25.2	21.7	32.3	28.6	1.6	1.17	33.2
UG1	S12	22.874	1.66	12.2	29.9	10.5	34.7	2.1	1.01	0.013	7.0	58		42.8	22.1	30.2	29.5	1.8	1.15	55.0
UG1	S14	23.347	2.73	6.0	30.1	10.7	34.1	2.0	0.98	0.023	7.0	54		28.2	21.7	32.2	28.5	1.6	0.93	34.3
UG1	S15	3.884	2.31	5.0	30.1	10.0	33.8	2.7	1.11	0.023	7.0	52		18.6	21.9	30.8	30.0	2.0	1.25	23.6
UG1	S18	0																		
TOTAL UG1		254.324																		

Table 25: Underground (UG2) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
UG2	S02	35.991	3.19	5.7	30.2	11.6	35.0	1.9	1.19	0.006	7.5	78		29.4	22.2	32.8	27.9	1.7	1.40	35.0
UG2	S04	0.418	1.61	5.3	31.1	9.1	35.3	1.7	1.18	0.009	8.0	74		27.5	21.2	34.7	28.1	1.5	2.29	32.9
UG2	S06	43.407	3.43	14.9	29.3	13.9	34.8	1.8	1.14	0.008	8.0	74		26.2	22.9	29.7	28.7	1.7	1.75	41.1
UG2	S08	37.202	3.01	18.7	29.6	12.5	35.1	1.7	1.12	0.008	8.0	74		34.3	22.9	30.3	28.1	1.5	1.75	53.0
UG2	S09	2.964	1.28	5.6	30.3	11.3	32.3	1.9	1.02	0.011	7.5	78		17.9	23.1	28.9	27.3	1.7	1.53	23.5
UG2	S11	10.911	1.92	4.5	30.2	11.1	33.0	1.9	0.95	0.013	8.0	80		23.6	22.0	31.8	27.6	1.5	1.04	28.0
UG2	S12	18.427	1.67	10.2	30.2	10.9	34.1	1.8	0.93	0.013	8.5	75		30.9	22.1	31.3	28.1	1.6	0.96	41.1
UG2	S14	15.677	2.46	4.2	30.4	10.7	33.9	2.0	1.01	0.024	8.0	69		26.1	22.3	30.5	29.7	1.7	0.98	30.3
UG2	S15	1.962	1.68	18.6	30.1	11.2	32.8	1.8	1.12	0.042	8.5	78		30.5	21.4	33.4	26.1	1.6	1.40	49.2
UG2	S18	0																		
TOTAL UG2		166.959																		

Table 26: Underground (UG3) washability products excluding fines

				PRIMARY PRODUCT AT RD 1.40										SECONDARY PRODUCT AT RD 1.80						
Resource Area Name	COAL PLY	Mineable In situ Tonnes (Mt)	PLY Thickness (m)	PYL %	PCV MJ/Kg	PAS %	PVM %	PIM %	PTS %	PTP %	SWELL	ROGA		SYL %	SCV MJ/kg	SAS %	SVM %	SIM %	STS %	Total Yield %
UG3	S02	15.643	3.51	5.9	29.9	12.1	35.3	1.7	1.16	0.006	8.0	79		28.3	22.4	32.8	28.0	1.6	1.49	34.2
UG3	S04	0																		
UG3	S06	18.337	3.11	15.0	29.3	13.8	34.8	1.8	1.02	0.009	7.5	75		24.7	23.1	30.4	28.5	1.7	1.63	39.8
UG3	S08	23.991	4.24	17.7	29.4	12.9	35.2	1.8	1.16	0.009	8.0	78		30.1	23.2	29.7	28.5	1.6	1.86	47.8
UG3	S09	2.588	2.21	5.0	30.7	10.5	34.7	1.6	1.01	0.009	7.5	81		15.2	22.6	30.7	28.5	1.6	2.02	20.2
UG3	S11	4.344	2.06	8.7	30.0	12.1	35.1	1.8	1.00	0.020	8.5	81		24.3	22.2	30.9	29.3	1.5	1.08	33.0
UG3	S12	9.382	2.18	4.6	31.1	9.2	33.1	2.0	0.99	0.021	8.5	78		16.5	22.0	31.0	28.0	1.6	1.19	21.1
UG3	S14	7.754	2.94	7.3	30.4	10.8	34.9	1.8	1.16	0.026	8.0	83		21.3	23.2	28.9	30.1	1.5	1.42	28.7
UG3	S15	0																		
UG3	S18	0																		
TOTAL UG3		82.039																		

8.1.2 Large Diameter Quality Data

It is generally accepted that reliable estimates of coking coal yields are often not achievable from laboratory testing of slim core (TNW/HQ) samples and that results obtained from large diameter core samples are considered more realistic. Universal to date completed 22 large diameter (123mm diameter) bore holes, twinning 20% of the slim diameter holes, initially focussing on the Southern Opencast Resource Area (refer to Figure 40).

Table 27 overleaf compares theoretical coking coal yields and ash contents for the Southern Opencast Resource Area based on the analysis of samples from the large diameter and duplicated (twin) slim diameter boreholes. We can however assume that similar results will be achieved for the reminder of the resource areas. Note that as mentioned in section 4, only Yield, Ash and Free Swelling index tests were done for the large diameter samples and not all the coal plies from the large diameter holes have been analysed and tested, but generally were only done for S02, upper portion of S04, S06, S08, S09 & S11, S12 & S14.

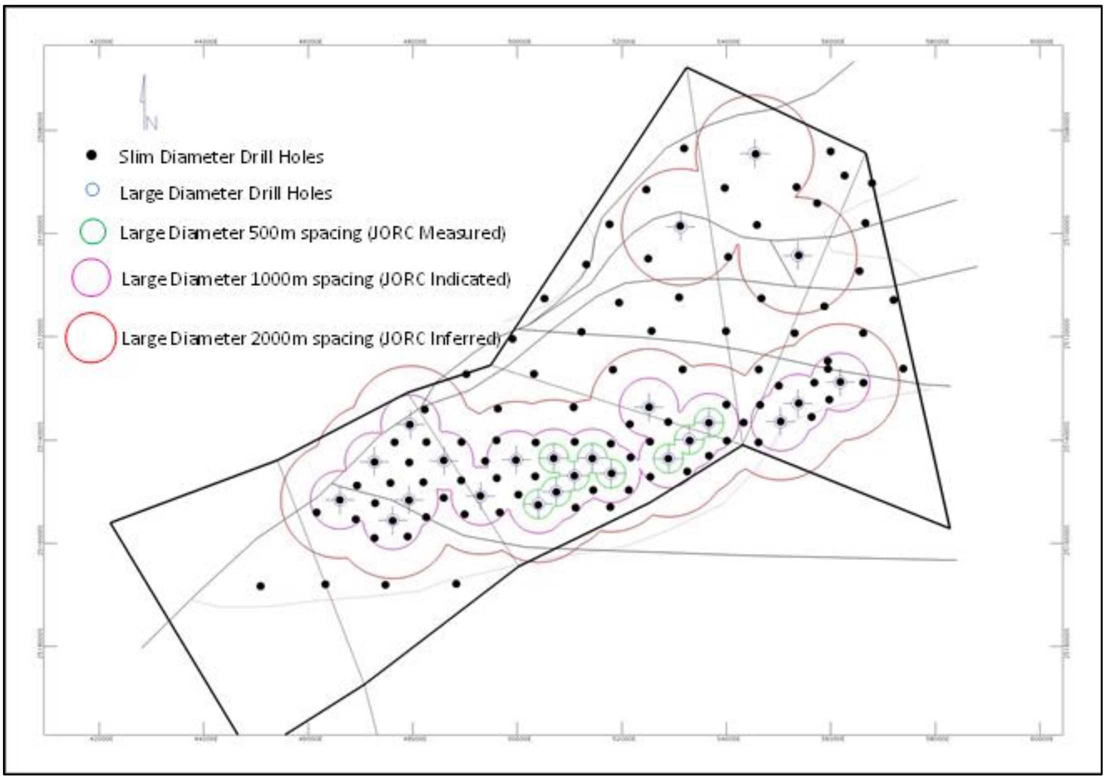

Figure 40: Large Diameter Drilling Programme and JORC Categorisation

Table 27: Large diameter versus slim diameter: Theoretical coking coal yield and ash content for the Southern opencast resource area

Ply	Theoretical Coking Coal Yield %			Ash Content (ad) %		
	Slim diameter	Large Diameter	% Difference	Slim diameter	Large Diameter	% Difference
S02L	14.5	22.2	+53%	11.4	10.0	-15.8%
S06	15.4	21.2	+38%	11.8	10.4	-15.4%
S08	24.0	29.1	+21%	11.4	10.4	-12.1%
S09	7.2	11.0	+54%	11.6	9.6	-8.4%
S11	10.2	11.8	+15%	10.6	9.2	-16.9%
S12	12.7	12.8	+1%	9.4	8.5	-13.1%
S14	8.5	14.5	+71%	9.7	8.7	-9.7%
Average	13.8	18.8	+40%	11.0	9.7	-12.0%

Theoretical coking coal yields obtained from the large diameter samples at Berenice Cygnus are on average 40% higher (varying between 1% and 71%) than those obtained from the twin slim diameter samples and the ash content 12% (1-2%) lower, averaging 9.7%.

Further studies are required to understand the reasons for the superior yields and lower ash contents obtained from the large diameter samples, however at this stage the major difference may be attributed:

- To the fact that the large diameter samples were crushed to a 12.5mm top size compared to the 25mm top size for the slim diameter samples which may have resulted in better liberation of the coking coal (higher yield) and ash (lower ash), and

- Coking coal yields from the <0.5mm>212micron fraction, typically representing 1-2% of the total sample mass and containing up to 50% coking coal, were included in the large diameter washability results, further increasing the yields of the coking coal fraction and improving reported coal quality. This was not the case for the slim diameter samples.

It can be seen that the yields from the large diameter borehole samples are between 1-70% higher than for the slim core equivalent; with an average increase of 40%. The reported product ash values are also up to 1-2% lower for the same cut point density. This strongly suggests that actual coking coal yields achieved in the production situation will be much higher with improved qualities, than those indicated by the results of the slim core test work.

The results from this SD/LD comparative study are in line with results obtained from similar studies done by CoAL at the Vele and Makhado coking coal projects in the Soutpansberg and Tuli coalfields.

8.2 Overview of Coking Coal Types

Metallurgical coal is high-quality bright coal which is less abundant than thermal coal and is primarily used in the production of coke which is an important part of the integrated steel mill process. While metallurgical coal is primarily used by steel companies, it is also used by a variety of other industrial users to heat and power foundries, cement plants, paper mills, chemical plants, and other manufacturing and processing facilities. Metallurgical coal can be broken up into two main categories: coking coal and PCI (pulverised coal injection), and is used in the steel industry, as opposed to the lower grade thermal coal that is used to generate electricity in power stations. Coals as straight or in blend which on carbonization produce hard coke are known as coking coals.

Coking coal may be further sub-divided into 3 sub-categories, namely:

- **Primary (Hard) Coking Coal** (low ash, low volatile matter, high coking propensity)
- **Medium (Soft) Coking Coal** (low ash, medium volatile matter, low caking index)
- **Semi/Weak (Semi-Soft) Coking Coal** (low ash, high volatile, very low caking index).

Depending upon coking/caking capacity, coking coals are divided into prime or 'hard' coking coal, medium or 'soft' coking coals and weakly or 'semi-soft' coking coals. These coking coal types are classified based on physical and chemical properties. In terms of coal trading, the terms "hard" and "soft" or "semi-soft" coking coal are used, the first mentioned type having good coking propensity and blast furnace performance. Hard coking coal tends also to be referred to as "straight" coking coal and makes hard coke when carbonised in the coke oven. "Soft" coking coals generally make soft (or weak) coke when coked alone in a coke oven. "Semisoft" types tend to be used in coking blends with hard or straight coking coal and are also known as "Blend Coking Coal".

There is a fourth category of metallurgical coal referred to as PCI coal. PCI coal is generally not considered to be a coking coal, rather it is used primarily for its heat value and is injected into a blast furnace to replace expensive coke.

Semi-soft and PCI coals normally have lower sales values compared to hard or straight coking coal due to the relative availability of these products.

Tables 28 and 29 summarise the qualities and coking properties of the coking coal fraction (CF1.40) for a bulk sample of the S06 and S08 plies collected from the large diameter drilling completed in 2010.

Table 28: Berenice Cygnus large diameter bulk sample coking coal properties

COAL QUALITIES AND COKING PROPERTIES	UNIT	PLY S06	PLY S08
Proximate Analyses (air dried basis)			
Inherent Moisture	%	2.02	2.11
Ash	%	11.58	11.93
Volatile Matter	%	36.23	35.77
Fixed Carbon	%	50.16	50.19
Calorific Value (Gross)	Mj/kg	30.19	30.06
Total Sulphur	%	0.92	1.08
Phosphorous (in coal)	%	0.009	0.009
Ultimate Analyses (dry basis)			
Carbon	%	76.53	76.38
Hydrogen	%	5.01	4.98
Oxygen (by diff.)	%	2.29	2.11
Sulphur:	%	0.93	1.07
Pyritic	%	0.16	0.25
Sulphate	%	0.48	0.33
Organic	%	0.32	0.53
Caking Properties			
FSI		7 (5-9)	7 (5.5-9)
Roga		85 (79-91)	84 (77-92)
Grey King Index		G9	G9
Gieseler Plasticity			
Max Fluidity	ddpm	20174 (14724-29145)	19665 (3466-29183)
Max Fluidity Temp	˚C	437	436
Initial softening Temp	˚C	397	394
Solidification Temp	˚C	477	476
Arnu Dilitation			
Max Contraction	%	29	27
Max Dilatation	%	147	137

T1 – Initial Softening Temp	˚C	357	358
Max Contraction Temp	˚C	405	404
Max Dilatation Temp	˚C	466	464
Petrographic Analyses			
Vitrinite	%	85.56	82.90
Total Reactives	%	89.71	87.94
Total Inerts	%	10.29	12.09
RoV max		0.80	0.79
RoR max		0.80	0.80
Composition Balance Index		0.58	0.69
Ash Composition			
LOI	%	0.84	0.59
SiO2	%	64.33	64.30
Al2O3	%	20.71	22.33
Fe2O3	%	7.23	6.42
TiO2	%	0.87	0.92
P2O5	%	0.048	0.061
CaO	%	0.34	0.52
MgO	%	0.49	0.25
Na2O	%	0.43	0.31
K2O	%	2.43	2.13
MnO	%	0.05	0.05
SO3	%	0.89	0.89

Table 29: Berenice Cygnus large diameter bulk sample ash fusion, abrasiveness index and HGI tests

Sample	**Ash Fusion Temperature , Air Dry Basis (°C)**								**AI** (MgFe/4kg)	**HGI**
	Reducing Atmosphere				**Oxidising Atmosphere**					
	Def	**Soft**	**Hem**	**Flow**	**Def**	**Soft**	**Hem**	**Flow**		
Coking Coal Fraction (F1.30-F1.40)	1430	1450	1470	1500	1460	1480	1500	+1500	59	55
Composite F1.45-F1.70	1330	1350	1380	1420	1360	1400	1420	1450	179	58
Composite F1.80-F1.90	1480	1500	+1500	+1500	+1500	+1500	+1500	+1500	169	61

The analyses show that the coking coal product has moderate to low moisture, high volatile matter, low phosphorous and moderate sulphur contents.

Free Swelling Indices (FSI) and Roga Indices are relatively high, ranging from 5 to 9 and 77 to 92 respectively and the Gray King Indices are in the upper ranges of G8 to G11.

The high vitrinite content of about 82% to 85% is attractive as a commercial premium and is often placed on coking coals with elevated vitrinite percentage.

The average RoV_{max} of 0.80% is relatively low and the maximum Fluidity is very high, averaging approximately 20,000 ddpm. The high maximum Fluidity is again very attractive and usually attains a commercial premium.

The Ash Fusion Temperatures, Abrasiveness Index and HGI all meet requirements.

On the basis of the 2010 bulk sampling test work, the Berenice coking coal product could be classed as a Medium Rank C, high vitrinite (82-85%), medium ash (9.5-10.5%), soft coking coal (according to ISO 11760: 2005 Classification of Coal by Rank) with high volatile content (+34% vols.), good caking properties (FSI (5-9), Roga (77-92), Grey King (G8-G11)) and high Fluidity (± 20,000ddpm).

Universal Coal further requested that a coke be prepared (on a laboratory scale) from a composite of the coking coal fraction of the S6 and S8 bulk samples and be subjected to a number of analyses and tests (Proximates, Hot Strength, Drum Indices and Ash Analyses). The results of these tests are summarised in Tables 30 and 31 overleaf.

The coke has a fixed carbon content of approximately 80%, a volatile matter content of 0.8% and a relatively high ash content of 19%. A Coke Strength after Reaction (CSR) of 28.7% was obtained which is commensurate with the low average RoV_{max} of the Berenice soft coking coals. As there is an inverse relationship between CSR and Coke Reactivity Index (CRI), the latter values are correspondingly high. The Micum Drum Indices are within acceptable limits.

It should be noted that the coking and coke quality data is based on a small sample population and should at this stage be viewed as only indicative of the type of coking coal and coke that can be produced at Berenice. Further analyses and test work are currently being undertaken on a more representative sample taken from the 2012 large diameter drilling.

Table 30: Berenice Cygnus coke analyses and tests

COKE QUALITIES	UNIT	COKE SAMPLE
Proximate Analyses		
Inherent Moisture	%	0.5
Ash	%	19.4
Volatile Matter	%	0.8
Fixed Carbon	%	79.3
Total Sulphur	%	0.77
Phosphorous (in coke)	%	0.012
Hot Strength		
Coke Strength after Reaction (CSR)	%	28.7
Coke Reactivity Index (CRI)	%	35.2
Drum Indices		
Micum 10 Index	%	8.75
Irsid 10 Index	%	22.38
Irsid 20 Index	%	74.81

Table 31: Berenice Cygnus ash of coke analyses

ASH ON COKE ANALYSES	UNIT	COKE SAMPLE
LOI	%	0.30
SiO_2	%	64.3
Al_2O_3	%	21.7
Fe_2O_3	%	6.16
TiO_2	%	1.20
P_2O_5	%	0.10
CaO	%	1.95
MgO	%	1.04
Na_2O	%	0.09
K_2O	%	1.42
MnO	%	0.08
SO_3	%	0.44

APPENDIX A

List of borehole collars

BOREID	Easting	Northing	Elevation	TYPE	EOH	AZI	DIP	Coordsys
BE548_001	-55997.180	2508411.000	683.83	A	100.01	0	-90	LO29_WGS84
BE548_002	-54560.840	2508461.100	686.65	A	115.14	0	-90	LO29_WGS84
BE548_003	-54586.870	2509835.600	697.52	A	85.06	0	-90	LO29_WGS84
BE548_03LD	-54592.327	2509838.788	697.60	XLD2	18.00	0	-90	LO29_WGS84
BE548_004	-54672.210	2511256.980	702.29	A	271.59	0	-90	LO29_WGS84
BE548_005	-54620.710	2512633.000	709.61	A	209.45	0	-90	LO29_WGS84
BE548_006	-55738.740	2509414.260	667.12	A	62.17	0	-90	LO29_WGS84
BE548_007	-53971.290	2509118.320	687.81	A	99.21	0	-90	LO29_WGS84
BE548_07LD	-53978.211	2509122.938	688.02	XLD2	8.00	0	-90	LO29_WGS84
BE548_008	-55344.650	2509101.750	661.69	A	56.27	0	-90	LO29_WGS84
BE548_009	-56264.590	2508880.190	692.76	A	70.00	0	-90	LO29_WGS84
BE548_09LD	-56264.037	2508884.518	692.95	XLD2	25.00	0	-90	LO29_WGS84
BE548_010	-55383.610	2510424.160	701.01	A	150.98	0	-90	LO29_WGS84
BE548_011	-54037.900	2510455.050	694.44	A	150.00	0	-90	LO29_WGS84
BE548_012	-53993.498	2511892.654	703.14	AP2	290.18	0	-90	LO29_WGS84
BE548_034	-54332.776	2513662.163	716.79	AP2	123.49	0	-90	LO29_WGS84
BE548_02LD	-54545.394	2508453.661	686.46	LD	93.84	0	-90	LO29_WGS84
BE548_10LD	-55367.367	2510426.628	700.94	LD	132.85	0	-90	LO29_WGS84
CE547_001	-53192.500	2508353.200	687.78	A	122.25	0	-90	LO29_WGS84
CE547_01LD	-53189.943	2508357.826	688.35	XLD2	23.00	0	-90	LO29_WGS84
CE547_002	-51765.330	2509821.140	675.51	A	46.00	0	-90	LO29_WGS84
CE547_003	-53118.520	2509857.400	700.22	A	136.15	0	-90	LO29_WGS84
CE547_004	-53096.870	2511237.960	701.66	A	282.15	0	-90	LO29_WGS84
CE547_005	-51947.690	2511340.160	708.05	A	196.20	0	-90	LO29_WGS84
CE547_006	-50520.180	2511260.310	679.39	BMT	18.50	0	-90	LO29_WGS84
CE547_007	-50318.950	2512720.650	711.43	A	148.99	0	-90	LO29_WGS84
CE547_008	-51829.450	2512638.600	714.60	A	187.48	0	-90	LO29_WGS84
CE547_009	-53163.920	2512633.270	708.38	A	236.15	0	-90	LO29_WGS84
CE547_010	-51321.340	2510601.690	703.93	BMT	34.70	0	-90	LO29_WGS84
CE547_011	-51229.400	2511905.640	713.20	F	150.00	0	-90	LO29_WGS84
CE547_012	-52469.200	2509151.250	694.59	A	90.00	0	-90	LO29_WGS84
CE547_013	-52505.880	2510488.190	702.46	A	100.00	0	-90	LO29_WGS84
CE547_014	-52569.820	2511887.618	711.03	AP2	255.51	0	-90	LO29_WGS84
CE547_015	-49909.646	2512043.505	706.80	AP2	89.08	0	-90	LO29_WGS84
CE547_016	-52523.597	2513364.298	715.23	AP2	190.40	0	-90	LO29_WGS84
CE547_017	-54001.570	2513314.734	713.40	AP2	183.82	0	-90	LO29_WGS84
CE547_018	-53668.196	2513666.922	715.70	AP2	171.01	0	-90	LO29_WGS84
CE547_16LD	-52519.035	2513365.578	715.33	LD2	145.43	0	-90	LO29_WGS84
CE547_18LD	-53668.362	2513662.412	715.71	LD2	109.38	0	-90	LO29_WGS84

CE547_03LD	-53126.257	2509875.530	700.55	LD	130.00	0	-90	LO29_WGS84
CE547_07LD	-50336.098	2512719.752	711.47	XLD	50.00	0	-90	LO29_WGS84
CN54901	-54291.350	2514113.050	713.80	H	107.65	0	-90	LO29WGS
CN54902	-55956.340	2513548.060	718.10	H	78.20	0	-90	LO29WGS
CN54903	-55116.350	2512138.060	705.60	H	270.15	0	-90	LO29WGS
CN54904	-56331.340	2509323.070	688.60	H	84.00	0	-90	LO29WGS
CN54905	-57971.340	2511823.060	704.40	H	186.00	0	-90	LO29WGS
CS549_001	-56788.900	2509025.090	693.62	A	68.12	0	-90	LO29_WGS84
CS549_002	-55877.100	2511412.760	711.90	A	225.89	0	-90	LO29_WGS84
CS549_003	-57201.840	2511288.720	706.98	A	206.00	0	-90	LO29_WGS84
CS549_004	-57387.030	2512618.710	715.35	A	118.62	0	-90	LO29_WGS84
CS549_005	-55946.540	2512623.680	716.08	XF	156.40	0	-90	LO29_WGS84
CS549_006	-54617.560	2514046.090	720.21	A	61.91	0	-90	LO29_WGS84
CS549_007	-55384.580	2513286.910	716.58	A	80.00	0	-90	LO29_WGS84
CS549_008	-56624.900	2512891.910	718.95	A	71.15	0	-90	LO29_WGS84
CS549_009	-56620.060	2511928.550	711.83	A	180.00	0	-90	LO29_WGS84
CS549_010	-55308.540	2511931.500	709.03	A	206.15	0	-90	LO29_WGS84
CS549_011	-56548.760	2510728.680	702.02	A	195.00	0	-90	LO29_WGS84
CS549_012	-55943.710	2512470.530	715.2	A	150.00	0	-90	LO29_WGS84
CS549_013	-56661.380	2509798.460	698.97	BMT	24.77	0	-90	LO29_WGS84
CS549_015	-55971.674	2513217.921	719.38	AP2	120.54	0	-90	LO29_WGS84
CS549_016	-55041.759	2513643.221	719.29	AP2	64.95	0	-90	LO29_WGS84
CS549_017	-56182.151	2512876.139	718.53	AP2	134.84	0	-90	LO29_WGS84
CS549_018	-55685.272	2512888.356	716.34	AP2	168.30	0	-90	LO29_WGS84
CS549_019	-55005.179	2512949.332	713.75	AP2	161.90	0	-90	LO29_WGS84
CS549_020	-54646.890	2513320.793	714.92	AP2	116.16	0	-90	LO29_WGS84
CS549_021	-55632.518	2513553.416	719.81	BP2	43.51	0	-90	LO29_WGS84
CS549_16LD	-55039.367	2513646.226	719.38	LD2	51.20	0	-90	LO29_WGS84
CS549_17LD	-56179.353	2512879.827	718.59	LD2	114.09	0	-90	LO29_WGS84
CS549_07LD	-55371.199	2513290.903	717.05	LD	78.50	0	-90	LO29_WGS84
CS549_12LD	-55926.830	2512471.922	715.44	XLD	50.00	0	-90	LO29_WGS84
DT355_001	-49023.960	2512725.470	684.30	A	71.15	0	-90	LO29_WGS84
DT355_002	-48932.720	2514038.540	693.11	A	126.46	0	-90	LO29_WGS84
DT355_003	-50352.030	2514047.290	723.71	A	136.35	0	-90	LO29_WGS84
DT355_004	-51790.640	2514071.390	724.61	A	130.78	0	-90	LO29_WGS84
DT355_005	-53298.130	2514011.140	718.41	A	139.37	0	-90	LO29_WGS84
DT355_006	-51780.070	2515299.120	728.62	A	60.85	0	-90	LO29_WGS84
DT355_007	-50399.120	2515256.510	729.63	A	82.56	0	-90	LO29_WGS84
DT355_008	-51078.532	2513366.217	693.50	AP2	164.72	0	-90	LO29_WGS84
DT355_009	-49627.783	2513394.586	694.05	AP2	153.56	0	-90	LO29_WGS84
DT355_010	-48228.345	2513409.766	687.00	AP2	88.00	0	-90	LO29_WGS84
DT355_011	-49608.008	2514739.381	700.95	AP2	101.98	0	-90	LO29_WGS84
DT355_012	-51093.066	2514693.561	702.07	AP2	85.14	0	-90	LO29_WGS84
DT355_013	-52545.250	2514714.296	700.89	AP2	127.47	0	-90	LO29_WGS84

DT355_014	-51100.458	2514034.219	697.57	AP2	155.91	0	-90	LO29_WGS84
DT355_015	-49601.130	2514006.425	695.84	AP2	137.72	0	-90	LO29_WGS84
DT355_016	-49386.609	2514407.904	697.83	AP2	131.65	0	-90	LO29_WGS84
DT355_017	-49974.708	2514388.723	700.35	AP2	134.65	0	-90	LO29_WGS84
DT355_018	-50696.978	2514354.228	701.13	AP2	145.03	0	-90	LO29_WGS84
DT355_019	-50342.910	2514704.061	703.15	AP2	141.47	0	-90	LO29_WGS84
DT355_020	-49294.853	2515081.885	702.72	AP2	89.57	0	-90	LO29_WGS84
DT355_021	-50020.650	2515058.518	704.28	AP2	94.41	0	-90	LO29_WGS84
DT355_022	-50746.995	2515007.202	704.46	AP2	121.52	0	-90	LO29_WGS84
DT355_023	-51115.388	2515309.484	706.21	AP2	99.96	0	-90	LO29_WGS84
DT355_024	-49665.129	2515401.846	706.83	AP2	67.68	0	-90	LO29_WGS84
DT355_031	-52153.284	2513694.609	695.90	AP2	148.42	0	-90	LO29_WGS84
DT355_032	-52888.567	2513651.304	715.72	AP2	203.71	0	-90	LO29_WGS84
DT355_033	-54011.817	2514015.512	719.14	AP2	112.16	0	-90	LO29_WGS84
DT355_034	-52539.521	2514031.698	695.76	AP2	154.42	0	-90	LO29_WGS84
DT355_035	-51435.601	2514356.071	699.91	AP2	141.58	0	-90	LO29_WGS84
DT355_036	-52168.993	2514334.962	698.79	AP2	137.58	0	-90	LO29_WGS84
DT355_037	-52890.399	2514361.139	698.35	AP2	167.80	0	-90	LO29_WGS84
DT355_038	-53669.937	2514306.188	720.73	AP2	133.04	0	-90	LO29_WGS84
DT355_039	-53252.999	2514609.866	723.38	AP2	185.42	0	-90	LO29_WGS84
DT355_040	-51803.273	2514647.076	701.63	AP2	144.53	0	-90	LO29_WGS84
DT355_041	-51452.944	2514971.935	703.60	AP2	128.68	0	-90	LO29_WGS84
DT355_042	-52133.940	2514969.754	702.71	AP2	116.82	0	-90	LO29_WGS84
DT355_12LD	-51093.080	2514691.614	702.18	LD2	113.47	0	-90	LO29_WGS84
DT355_13LD	-52547.894	2514711.360	700.98	XLD2	40.00	0	-90	LO29_WGS84
DT355_17LD	-49979.648	2514384.488	700.54	XLD2	52.42	0	-90	LO29_WGS84
DT355_18LD	-50696.032	2514351.888	701.36	LD2	109.04	0	-90	LO29_WGS84
DT355_20LD	-49299.466	2515084.651	702.88	LD2	56.16	0	-90	LO29_WGS84
DT355_22LD	-50745.781	2515001.865	704.35	LD2	68.12	0	-90	LO29_WGS84
DT355_30LD	-49946.718	2513650.359	695.39	XLD2	66.00	0	-90	LO29_WGS84
DT355_35LD	-51435.315	2514351.303	699.93	XLD2	52.69	0	-90	LO29_WGS84
DT355_37LD	-52893.962	2514360.859	698.46	LD2	104.39	0	-90	LO29_WGS84
DT355_40LD	-51793.245	2514649.651	701.64	LD2	93.75	0	-90	LO29_WGS84
DT355_05LD	-53291.732	2513993.687	718.56	LD	109.05	0	-90	LO29_WGS84
DT355_07LD	-50403.846	2515240.175	729.63	LD	79.40	0	-90	LO29_WGS84
LD354_001	-47652.970	2514042.500	714.35	A	132.37	0	-90	LO29_WGS84
LD354_002	-46159.350	2515403.040	715.18	A	128.20	0	-90	LO29_WGS84
LD354_003	-47615.240	2515562.530	701.62	A	112.57	0	-90	LO29_WGS84
LD354_004	-48991.750	2515438.960	714.79	A	68.20	0	-90	LO29_WGS84
LD354_005	-48832.630	2516785.500	713.46	BMT	43.00	0	-90	LO29_WGS84
LD354_006	-47476.430	2516803.850	721.33	A	61.15	0	-90	LO29_WGS84
LD354_007	-48201.486	2514817.458	696.44	AP2	108.85	0	-90	LO29_WGS84
LD354_008	-46932.801	2514881.340	704.89	AP2	143.49	0	-90	LO29_WGS84
LD354_009	-48594.041	2514396.265	694.75	AP2	125.79	0	-90	LO29_WGS84

LD354_010	-47932.123	2514435.454	693.86	AP2	142.28	0	-90	LO29_WGS84
LD354_011	-47267.376	2514425.878	698.70	AP2	154.15	0	-90	LO29_WGS84
LD354_012	-47571.794	2514831.401	696.77	AP2	139.15	0	-90	LO29_WGS84
LD354_013	-48926.772	2514782.819	698.07	AP2	108.37	0	-90	LO29_WGS84
LD354_014	-48592.845	2515118.993	701.26	AP2	98.50	0	-90	LO29_WGS84
LD354_015	-47926.897	2515165.657	698.01	AP2	127.19	0	-90	LO29_WGS84
LD354_016	-47278.815	2515223.278	699.14	AP2	136.29	0	-90	LO29_WGS84
LD354_017	-46601.200	2515160.153	697.94	AP2	132.16	0	-90	LO29_WGS84
LD354_018	-46908.177	2515534.516	702.57	AP2	133.10	0	-90	LO29_WGS84
LD354_019	-48256.369	2515494.488	703.58	AP2	100.02	0	-90	LO29_WGS84
LD354_020	-47901.172	2515868.460	703.96	AP2	86.64	0	-90	LO29_WGS84
LD354_021	-47267.365	2515897.485	703.44	AP2	120.94	0	-90	LO29_WGS84
LD354_022	-47944.884	2513700.404	689.72	AP2	103.17	0	-90	LO29_WGS84
LD354_023	-48260.420	2514040.612	691.22	AP2	130.24	0	-90	LO29_WGS84
LD354_03LD	-47615.020	2515554.605	701.26	LD2	69.02	0	-90	LO29_WGS84
LD354_09LD	-48596.121	2514403.699	694.94	LD2	99.61	0	-90	LO29_WGS84
LD354_11LD	-47264.907	2514420.140	698.68	LD2	117.01	0	-90	LO29_WGS84
LD354_15LD	-47922.689	2515157.836	698.01	LD2	82.71	0	-90	LO29_WGS84
LD354_17LD	-46605.093	2515159.960	698.16	LD2	91.66	0	-90	LO29_WGS84
LD354_22LD	-47954.626	2513695.586	689.68	LD2	78.57	0	-90	LO29_WGS84
LD354_03LD	-47619.531	2515548.173	701.12	XLD	50.00	0	-90	LO29_WGS84
MI358_001	-46327.080	2516795.340	727.98	A	52.52	0	-90	LO29_WGS84
MI358_002	-45087.330	2516830.200	723.34	A	66.10	0	-90	LO29_WGS84
W128	-52220.000	2511475.000	706.00	H	229.84	0	-90	LO29WGS
Y127	-53800.000	2513025.000	711.00	H	165.88	0	-90	LO29WGS

APPENDIX B

Terms and Definitions

- **'The JORC Code 2012 Edition'**. Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves.

- **'The Coal Guidelines 2014 Edition'**. Australian Guidelines for the Estimation and Classification of Coal resources.

- A ***'Competent Person'*** is a minerals industry professional who is a Member or Fellow of the Australasian Institute of Mining and Metallurgy, or of the Australian Institute of Geoscientists, or of a 'Recognised Professional Organisation' (RPO), as included in a list available on the JORC and ASX websites. These organisations have enforceable disciplinary process including the powers to suspend or expel a member.

- An ***'Inferred Coal Resource'*** is that part of a Coal Resource for which quantity and grade (or quality) are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade (or quality) continuity. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

  An Inferred Coal Resource has a lower level of confidence than that applying to an Indicated Coal Resource and must not be converted to a Coal Reserve. It is reasonably expected that the majority of Inferred Coal Resources could be upgraded to Indicated Coal Resources with continued exploration.

- An ***'Indicated Coal Resource'*** is that part of a Coal Resource for which quantity, grade (or quality), densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.

  Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to assume geological and grade (or quality) continuity between points of observation where data and samples are gathered.

An Indicated Coal Resource has a lower level of confidence than that applying to a Measured Coal Resource and may only be converted to a Probable Coal Reserve.

- A ***'Measured Coal Resource'*** is that part of a Coal Resource for which quantity, grade (or quality), densities, shape and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.

  Geological evidence is derived from detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to confirm geological and grade (or quality) continuity between points of observation where data and samples are gathered.

  A Measured Coal Resource has a higher level of confidence than that applying to either an Indicated Coal Resource or an Inferred Coal Resource. It may be converted to a Proved Coal Reserve or under certain circumstances to a Probable Coal Reserve.

- ***Geological loss factor***
  Discount factor applied in the case of gross in situ tonnage to account for as yet unobserved geological features that can occur between points of observation.

- ***Gross in situ coal resource*** (GTIS)
  Tonnage and coal quality, at specified moisture content, contained in the full coal seam above the minimum thickness cut-off and relevant coal quality cut-off parameters, as defined by the competent person.
  NOTE: The seam height does not include any external dilution or contamination material. No loss factors shall be applied to a gross in situ coal resource.

- ***Mineable in situ coal resource*** (MTIS)
  Tonnage and coal quality, at a specified moisture content, contained in the coal seams, or sections of the seams, which are proposed to be mined at the theoretical mining height, excluding dilution and contamination material, with a specific mining method and after the relevant minimum and maximum mineable thickness cut-off and relevant coal quality cut-off parameters have been applied.
  NOTE: The geological loss factor is applied to the mineable in situ coal resource tonnage.