PART 1

BE08 GLENDEN SEISMIC SURVEY

SEISMIC SURVEY REPORT

ATP 814P – QUEENSLAND

Lines
BE08-01
BE08-01A
BE08-02
BE08-03
BE08-03A
BE08-04

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1.0 INTRODUCTION

During the period from the 4th to the 7th of September in 2008 Terrex Seismic of Bibra Lake, WA, acquired 23.53km of seismic data consisting of six lines. The data was recorded using a 7.5m station interval and 240 live channels. Vibroseis was used as the data source and these conducted sweeps between pegs at every second station creating 60 fold data. This seismic was the initial phase of seismic acquired by Blue Energy Limited in ATP 814P Mt Hillalong Area.

Surveying, chaining and pegging was conducted by Dynamic Satellite Surveys of Yeppoon Qld between the 22nd and 24th of August. A report of their operations is included as Appendix A of this report

The survey was processed by Fugro Seismic Imaging Pty Ltd., 69 Outram Street, West Perth WA 6005 between November 2008 and January 2009.

2.0 LOCATION

The survey is located to the east of Glenden within 12km of the town, which is approximately 200km by road west of Mackay in North Queensland. The survey area overlies a portion of the northern Bowen Basin. It lies within the Nebo Synclinorium.

The main objective of the survey is to determine the depth and structure of the coals of the Rangal Coal Measures, Fort Cooper Coal Measures and if possible the top of the Moranbah Coal Measures.

3.0 GEOLOGY

The BE08 Glenden Seismic Survey was conducted in the the Nebo Synclinorium of the northern Bowen Basin. The target is to determine the structure of the Rangal Coal Measures and underlying Foert Cooper Coal Measures.

3.1 BOWEN BASIN

The Permo-Triassic Bowen Basin forms the northern extension of the Bowen-Gunnedah-Sydney Basin System in Queensland and New South Wales. The Bowen Basin is unconformably overlain by the sedimentary sequences of the Surat Basin as previously mentioned. The Bowen Basin comprises several sub-basins; the Taroom Trough (50,000km^2) along the eastern margin, the

Denison Trough (15,000km^2) along the western margin and the Comet Ridge which separates them both (Anthony, 2004).

The basin began as an extensive north-south trending back-arc, resulting from continent-ocean plate convergence (Veever et al., 1982). Early Permian back-arc extension on the western margins of the basin produced a series of half grabens, including the Denison Trough, where initial deposition commenced. Transgression of the sea westwards allowed delta systems to develop around the western and northern margins of the basin which continued into the Late Permian (Fielding et al., 1990a).

Compression in the Late Permian caused uplift and deformation of the eastern region of the basin containing alluvial volcano-lithic sediments. By the end of the Permian, the prograding deltas in-filled the remaining land-locked sea westwards forming the Black Alley Shale and resulting in peat-forming swamps forming the Bandanna Formation, Rangal Coal Measures and the Baralaba Formation (Fielding et al., 1990a).

The Bandanna Formation was deposited on the western margin of the Bowen Basin in a deltaic system infilling a large lake (represented as the Black Alley Shale) during the Late Permian. The formation has been correlated southward from the Denison Trough to the Roma Shelf (Paten & Groves, 1974) and consists of dominantly labile sandstone and coal with interbeds of siltstone and mudstone, ranging between 50 to 100m thick. The basal part of the formation is finer grained, coarsening upward to predominantly sandstone and, finally, coal (Exon, 1976).

3.1.1 Rangal Coal Measures

The Rangal Coal Measures were deposited in the northern Bowen Basin in a deltaic system and is the equivalent to the Baralaba Coal Measures in the southeast of the Bowen Basin and the Bandanna Formation in the Denison Trough and Roma Shelf areas. It consists of dominantly labile sandstone and coal with interbeds of siltstone and mudstone, ranging between 50 to 100m thick in the west but thicken toward the east to 200m at the Codrilla and Picardy coal deposits. The basal part of the formation is finer grained, coarsening upward to predominantly sandstone and, finally, coal (Exon, 1976).

The Rangal Coal Measures conformably underlies the Late Permian to Early Triassic Rewan Group. The Rewan Group consists of labile and sublabile sandstones, siltstones and mudstones. It characteristically is devoid of high amplitude reflections. It can readily be distinguished from the high amplitude reflections generated by the acoustic impeadance contrast of the coal within the Bandanna Formation.

The Rangal Coal Measures overlies the Black Alley Shale and Burunga Formation (Brakel et al 2009), In the most part it seems conformable however in the Wallumbilla- Namarah area there are indications that fault affected the marine Black Alley Shale but not he overlying coal measures indicating a sequence boundary. Seismic amplitudes are reduced within the Black Alley Shale compared to the Bandanna formation although higher than the Rewan Group.

3.1.2 Fort Cooper Coal Measures

The Fort Cooper Coal Measures were deposited in the northern part of the basin and is equivalent to the Fair Hill and Burngrove Formations in the central area of the basin and the Black Alley Shale and the upper part of the Peawaddy formation in the south. There is a marine transgression in the base of the Burngrove Formation and there is greater marine influence to the south. The Black Alley Shale and underlying Mantuan Productus Beds represent a marine transgression.

This was a period of major volcanism from the east and the Fort Cooper Coal Measures contain numerous tuff beds. The top of the Fort Cooper Coal measures is marked by the appearance of the Yarrabee Tuff. Above this tuff layer the coals of the Rangal Coal Measures are devoid of tuffs.

Brakel et al 2009 examined the seismic sequence stratigraphy of the southern Bowen Basin equivalents and correlate the Fort Cooper Coal Measures to between the B55 and B65 seismic horizons and thus includes the B60 seismic. The B60 seismic horizon represents a transgression event at the top of the Peawaddy.

3.1.3 Moranbah coal Measures

The Moranbah Coal Measures are found in the north of the Bowen Basin north of Peak Downs representing coastal plains deposits. The section thickens toward the east indicating the onset of Foreland loading. Further to the south the formation grades through the German Creek Coal Measures into the Peawaddy Formation

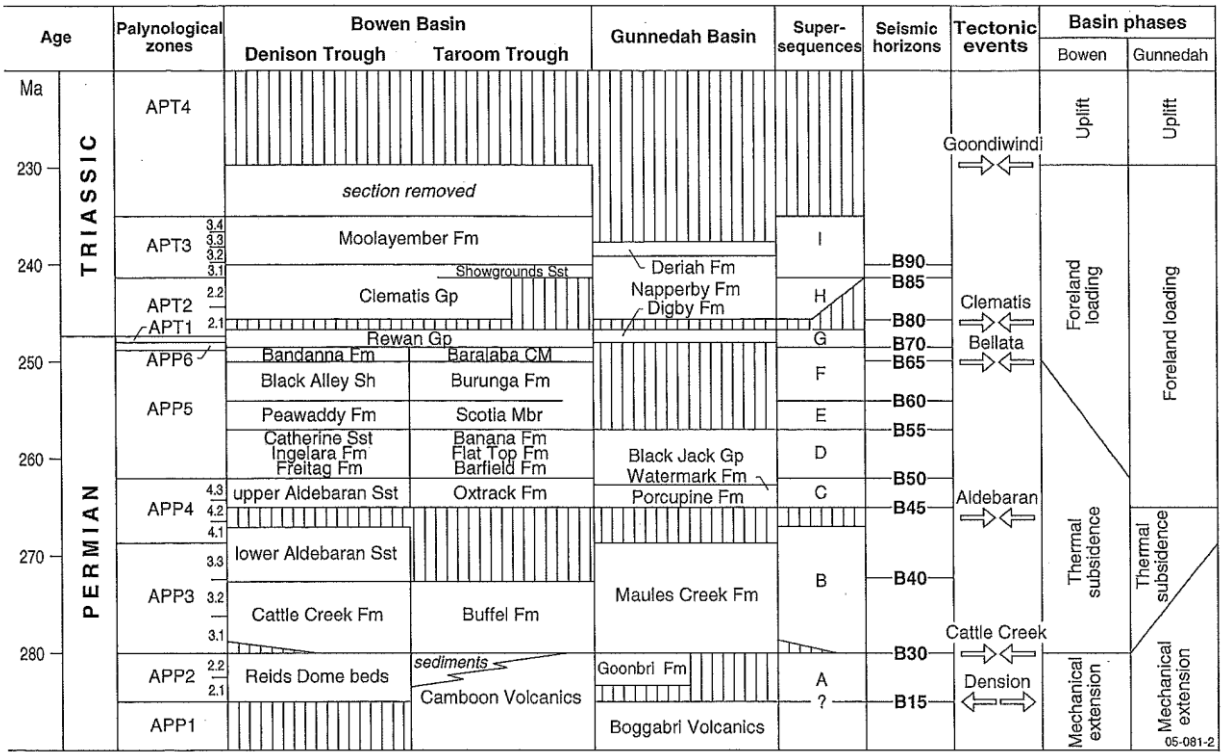

Figure 1 Stratigraphy of the Bowen Basin from Brakel et al 2009

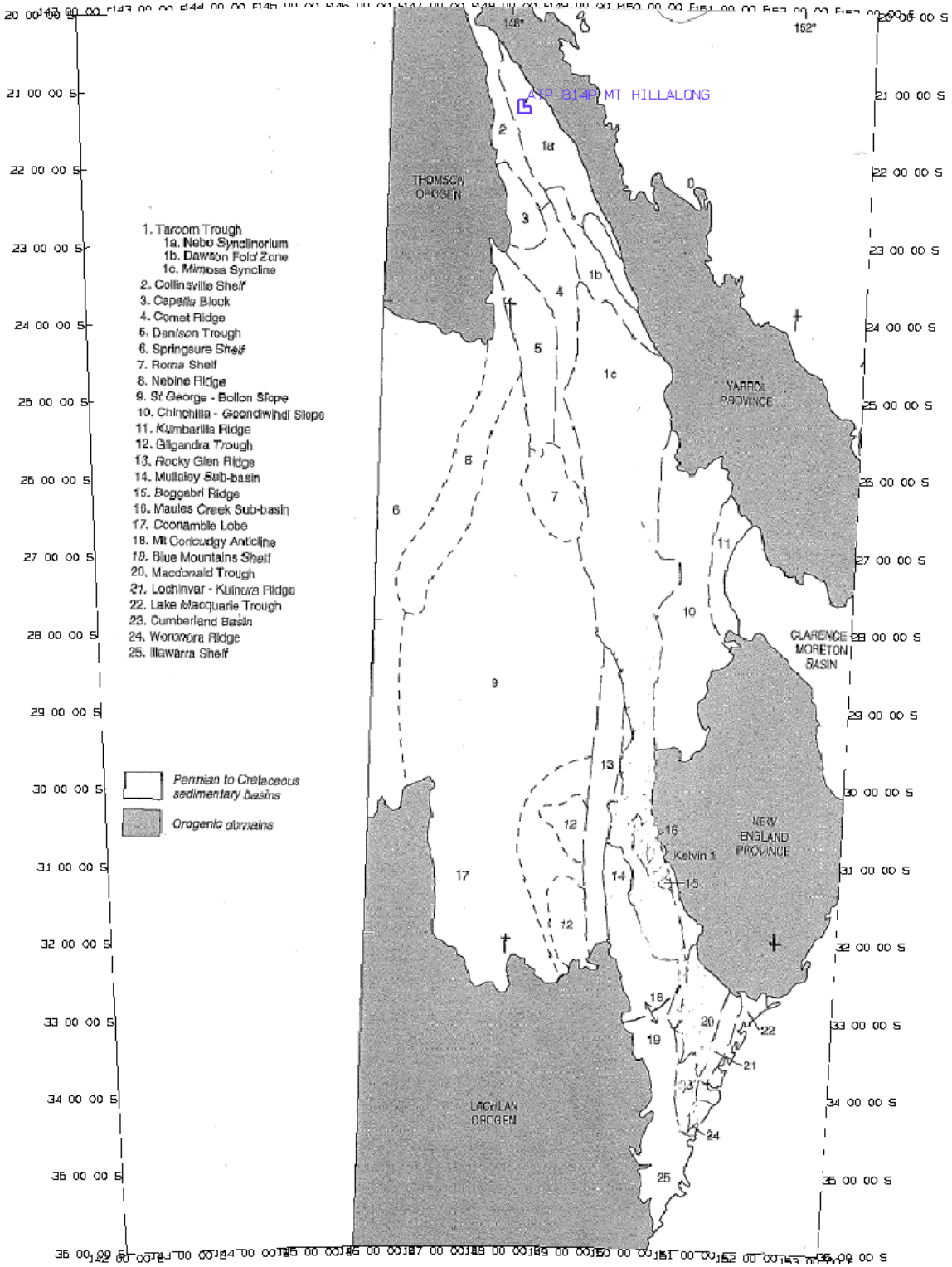

Figure 2 Structural setting of the Surat and Bowen Basins after Krassey et al 2009

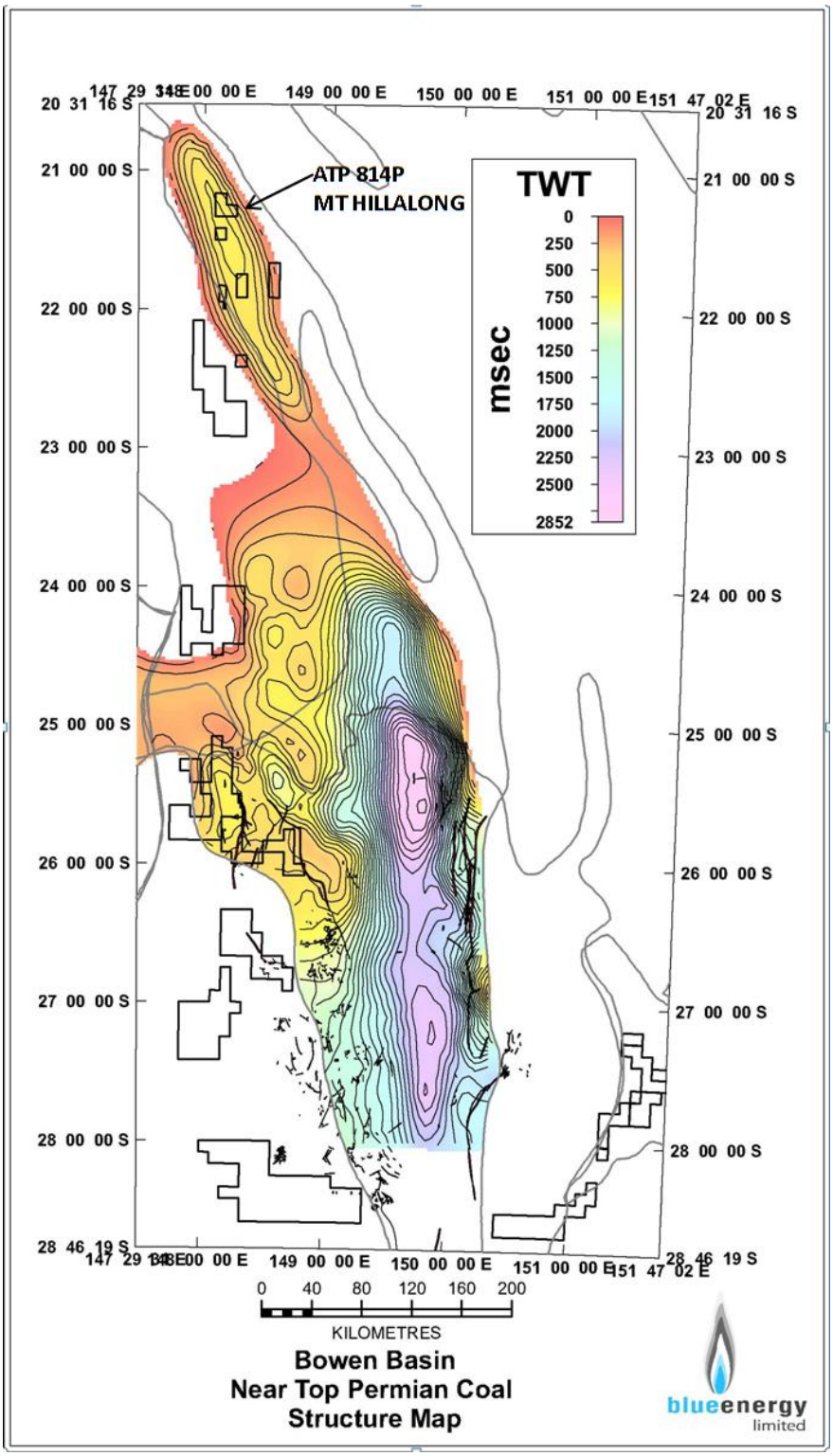

Figure 3 Bowen Basin time structure map of the top coal

4.0 ATP 814P

The BE08 Glenden Seismic Survey consisted of six lines and was conducted in the Mt Hillalong portion of ATP 814P.

The Mount Hillalong portion of ATP 814P consists of 3 graticular blocks or 239km^2 and was granted to Blue Energy as the sole title holder, for a twelve year term in February 2006. The acquisition of the BE08 Glenden Seismic Survey complies with a work commitment made under ATP814P to the Queensland Department of Mines and Energy to undertake 150km of seismic survey.

4.1 PREVIOUS SURVEYS

The northern Bowen Basin is largely devoid of conventional oil and gas exploration. Previous seismic recorded in this part of the basin was by Mitsubishi Gas Corporation resources Australia in their search for Coal Seam Methane. They recorded regional seismic lines to determine the structure of the Bowen Basin:

The earlier MGCRA seismic surveys were recorded using Japanese patented weight drop and the data was shipped back to Japan to be processed. Unfortunately it was processed with limited band width and as such is very difficult to interpret reliably. Electronic versions of the completed sections are now unavailable. The only sections available are tiff images of depth converted sections which do not appear to be of good quality. As the field data and support data has been shipped overseas it is also impossible to reprocess this data. The later surveys (1993 and 1994) were recorded by Australian seismic contractors and are generally of better condition.

Unfortunately the quality of the seismic data does not allow a comparison between those lines examined by Brakel et al 2009.

Year	Survey	Prefix	Operator
1990	MGCRA	MGC90	MGCRA
1991	MGCRA	MGC91	MGCRA
1992	MGCRA	MGC92	MGCRA
1993	MGCRA	MGC93	MGCRA
1994	MGCRA	MGC94	MGCRA

Table 1 Previous Seismic Surveys

4.2 WELL CORRELATION

There were no conventional or coal bed methane wells drilled within the Mt Hillalong permit area. There are several coal bed methane exploration wells and some GSQ stratigraphic wells drilled in areas adjacent to the permit

MGC Glenden 1 was drilled to 695m depth to intersect the Rangal Coal Measures at 547m and the upper Fort Cooper Coal Measures at 668m. This well was drilled as a coal bed methane well. A

sonic log was run from 76m to 693m. A vertical seismic profile was also performed. The well is on seismic line MGC91-2 at station 387.

BHP Leichhardt Range 1 was drilled to 1171m depth to intersect the Rangal Coal Measures which were encountered at 215m, The Fort Cooper Coal Measures at 345m and the Moranbah Coal Measures at 843m. This well was drilled as a coal bed methane exploration well. The well was drilled near station 1252 on seismic line MGC91-1. A sonic log was run from 94 to 748m and density log was run from 723 to 1171m

NQE Suttor Creek 1 was drilled to 1060m depth to intersect the Rangal Coal Measures at 148m, the Fort Cooper Coal measures at 340m and the Moranbah Coal Meausres at 860m. The well was a coal bed methane exploration well and was drilled prior to any seismic being recorded in the area. The well is located near station 134 on seismic lineMGC90-1. No wireline logging was done due to hole instability.

MGC Suttor Creek 2 is a coal bed methane exploration well drilled near station 218 on seismic line MGC91-1 in the Mt Hillalong portion of ATP 814P. The well was drilled to test the Rangal Coal Measures and the Girrah Seam of the Fort Cooper Coal Measures. A sonic and density log has been run over near the full length of the hole. The well reached a depth of 394m.

MGC Suttor Creek 3 is a coal bed methane exploration well drilled near station 376 on seismic line MGC91-1. The well was drilled to test the Rangal Coal Measures and the Girrah Seam of the Fort Cooper Coal Measures. The well reached a depth of 307m.

MGC Suttor Creek 4 is a production test well for coal bed methane drilled to test those horizons penetrated in Suttor Creek 1 and 2. It is situated near station 223 on seismic line MGC91-1. A density log has been run for near the full length of the hole.

5.0 OPERATIONS

5.1 ACQUISITION

The data was acquired between th 4th and 7th of September 2008 by Terrex Seismic of Bibra Lake WA. They have provided an operations report which is included as part of Appendix E.

Line	Start VP	End VP	Km	Dates Shot
BE08-01	100	740	4.8	5th-
BE08-01A	800	100	5.25	6th 7th
BE08-02	540	100	3.3	6th
BE08-03	478	260	1.635	6th
BE08-03A	420	190	1.725	7th
BE08-04	1010	100	6.825	4th-5th
TOTAL			**23.535**	

Table 2 line statistics

5.2 PROCESSING

The data was processed by Fugro Seismic Imaging Pty Ltd., 69 Outram Street, West Perth WA They have provided a processing report which is included as Appendix K of this report.

5.3 INTERPRETATION

Three time structure maps have been prepared; the top of the Rangal Coal Measures, the near top of the Fort Cooper Coal Measures and near the top of the Moranbah Coal Measures.

Previous seismic surveys are only available as tiff images of depth converted migrated stacks. The depth conversions have been performed using stacking velocities. Formation tops from the wells can be directly picked onto the depth sections. These depth sections can be correlated with care to the newly acquired time sections, given the poor quality of the depth sections due to excessive gain and limited band pass.

Static shifts were calculated for processing the data using a datum elevation of 250m with a replacement velocity of 2500m/sec. A bulk shift of 200msec was also applied to this data during processing. The BE08 Glenden Seismic Survey was corrected sea level to zero time, a shift of -.39 seconds was applied to achieve this.

5.3.1 The top of the Rangal Coal Measures

The top of the Bandanna formation is well defined. The Rangal Coal Measures contains thick coal seams where as the overlying Rewan Group sediments contain thick succession of often homogeneous overbank deposits and poorly interconnected channel deposits. This boundary produces very strong reflection events (Brakel et al 2009). On the depth sections these coal measures form parallel reflectors with severe clipping of both peaks and troughs due to excessive gain. These are the strongest reflectors on the time sections of the BE08 Glenden Seismic Survey.

5.3.2 The near top of the Fort Cooper Coal Measures

Below the strong parallel reflectors representing the coal measure sequences of the Rangal Coal Measures is a zone of moderate parallel and subparallel and bifurcating reflectors of the Fort Cooper Coal Measures. Any reflections from coals within the Fort Cooper Coal Measures have been filtered by the strong impedance contrast between the Rangal Coal Measures and Rewan Formation. The Fort Cooper Coal Measures contain numerous tuff bands throughout further subduing the seismic impedance contrast between the coals and surrounding sediment.

The reflectors representing the Fort Cooper Coal Measures occur below the B65 sequence boundary of Brakel et al 2009, and the B60 sequence boundary is above the base. The Fort

Cooper Coal Measure sequence on seismic sections examined here represents a facies change from those seismic sections examined by Brakel et al 2009 and hence are expected to have a different seismic character. Unfortunately the previous seismic surveys have been "overprocessed" and appear unnaturally sublinear and "wormy". The BE08 Glenden Seismic Survey reveals these reflectors to be less distinct than the Rangal Coal Measures above but due to the multiple effect.

5.3.3 The top of the Moranbah Coal Measures.

The Moranbah Coal Measure lie beneath the Fort Cooper Coal Measures. Erosion and onlap are evident at the top of the Moranbah Coal Measures indicating a sequence boundary. There does not appear to be a seismic character change across the boundary although reflectors are becoming weaker and more discontinuous with depth as the affect of internal multiples increase.

6.0 PROSPECTS AND LEADS

The survey is based on Coal Bed Methane exploration requirements where potential closures with potential for free flowing gas are not the targets. What is required is to determine the structural nature of the top coal surface.

The structure of the three surfaces are subparallel. The Top of the Fort Cooper Coal Measures lies about 150m below the top of the Rangal Coal Measures. The top of the Moranbah Coal Meaasures are about 500m below the top of the Fort Cooper Coal measures.

The Rangal Coal Measures and the Fort Cooper Coal Measures outcrop in the core of an anticline in the south east of the prospect area. The coal measures dip to the east, north and steeply to the west into a subsequent syncline. There are several thrust faults in the western limb of the anticline. The cliff forming Clematis Sandstone outcrops in the core of the syncline. At the top of this sandstone there are 1200m to the top of the Rangal Coal Measures and hence 1850m to the top of the Moranbah Coal Measures.

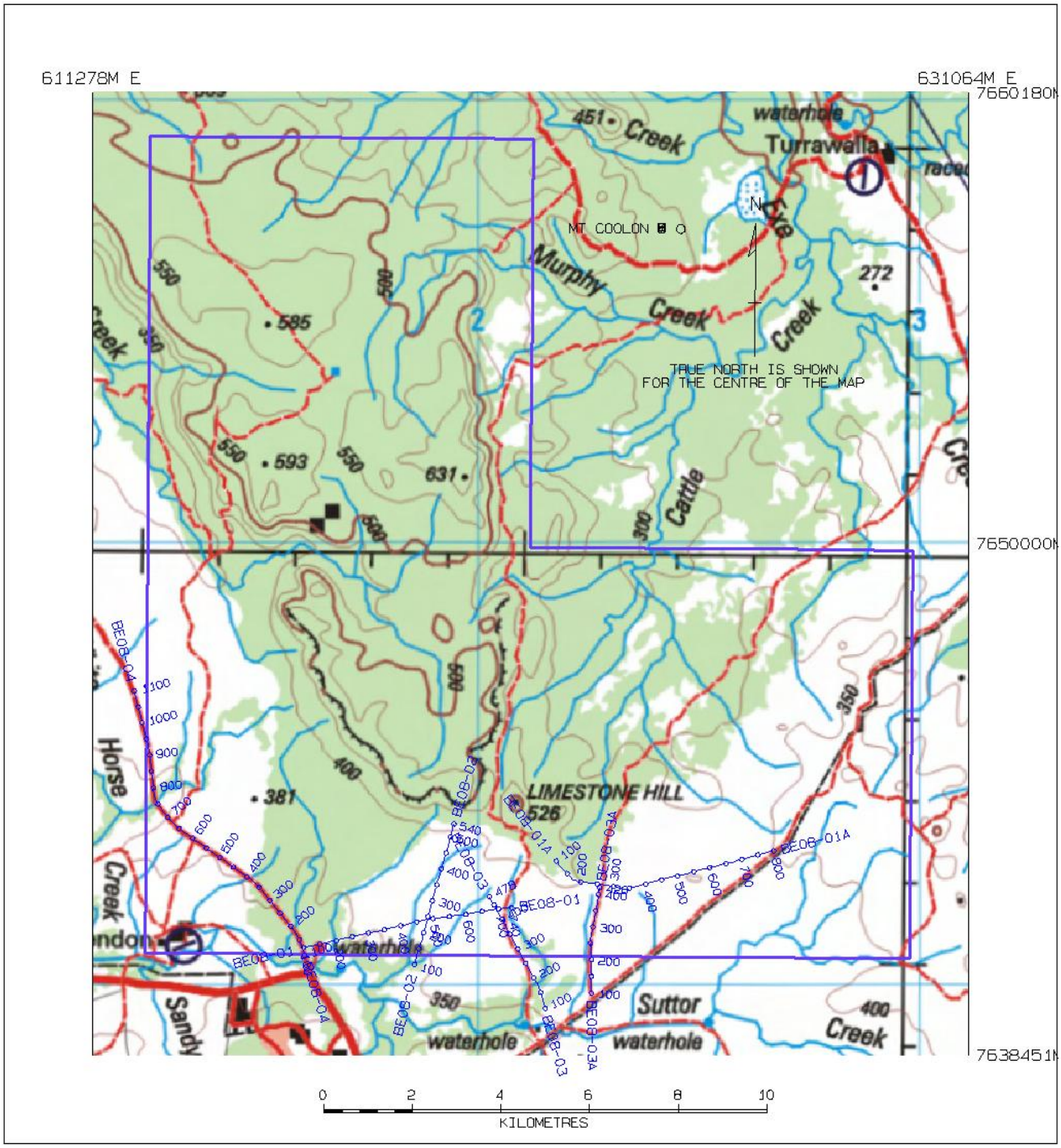

Figure 4 shotpoint basemap displaying nearby well positions and the BE08 Glenden Seismic survey

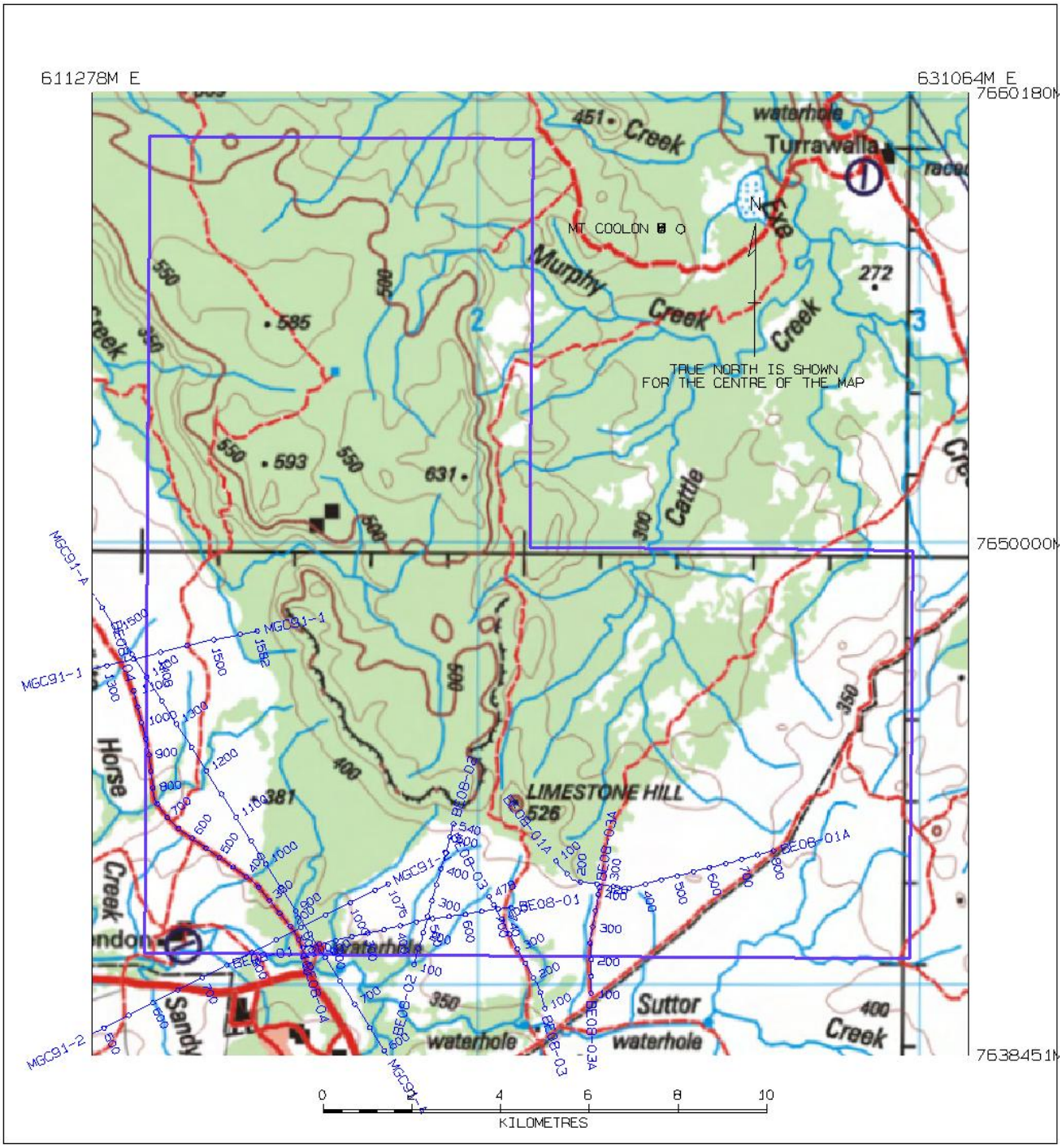

Figure 5 Shotpoint basemap showing BE08 Glenden and existing seismic surveys and wells near ATP814 Mt Hillalong

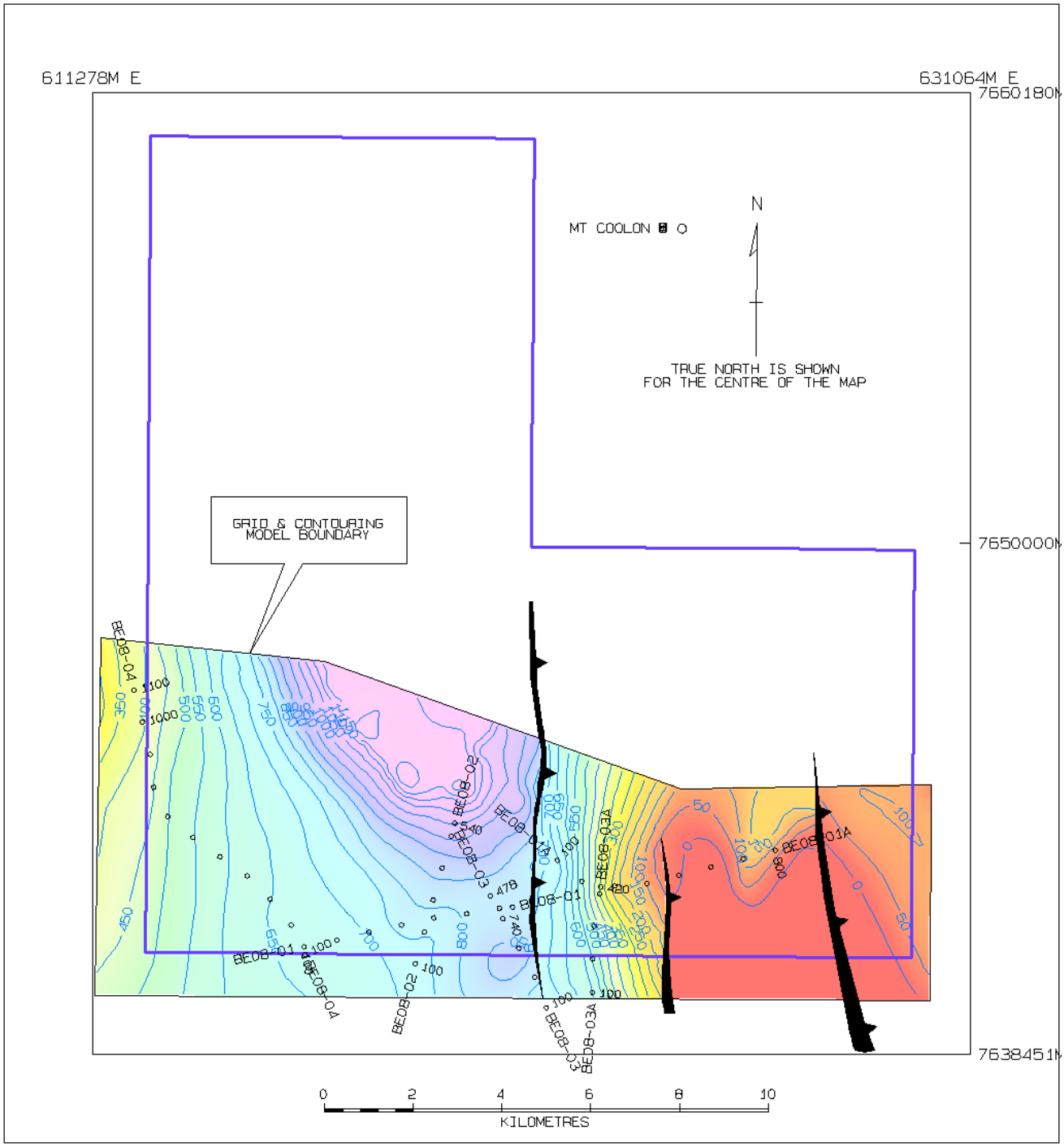

Figure 6 Depth map of the top coal of the Rangal Coal Measures

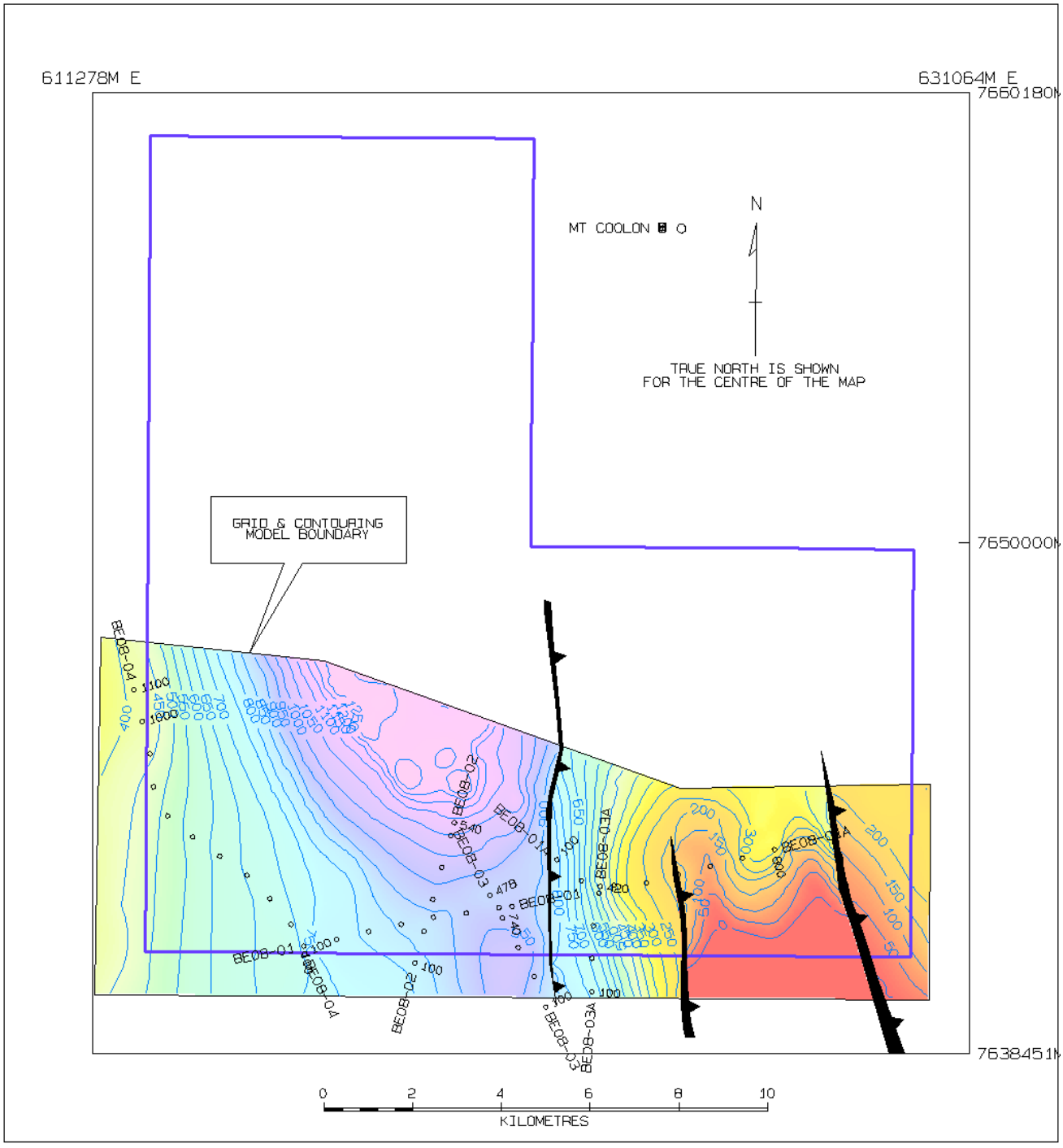

Figure 7 Depth map to the near top of the Fort Cooper Coal Measures

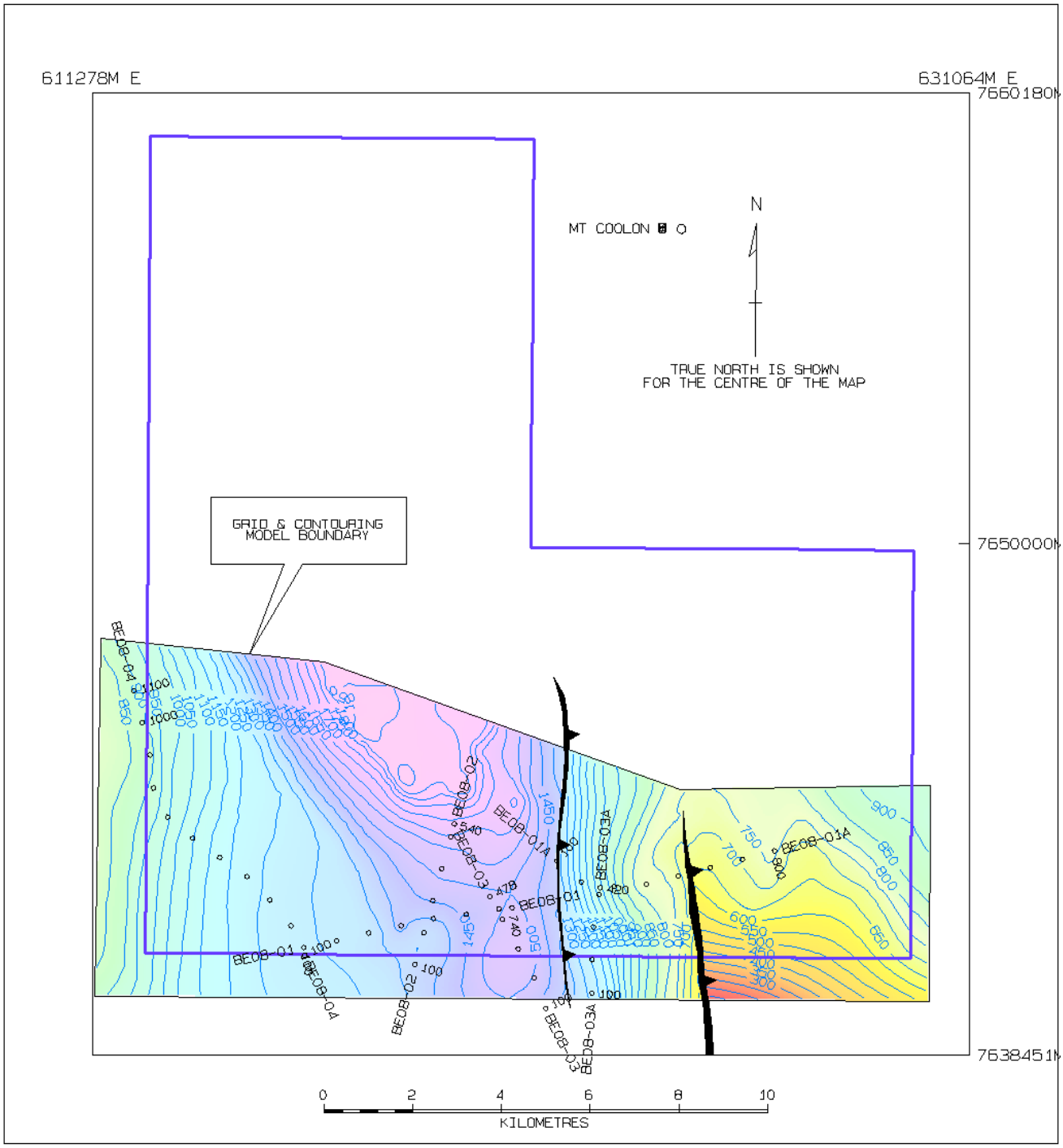

Figure 8 Depth map to near top of the Moranbah Coal Measures

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8.0 INTERPRETED SECTIONS