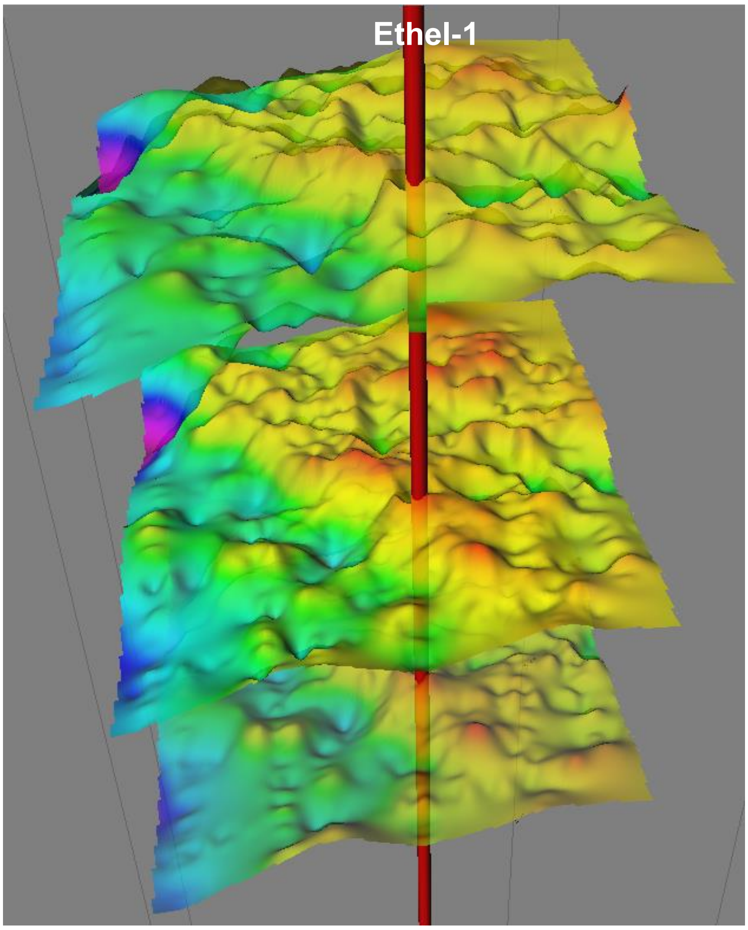
ATP 794B

COOPER-EROMANGA BASIN, SOUTHWEST QUEENSLAND

Ethel 2D Seismic Survey

Seismic Interpretation Report



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DISCLAIMER

Any interpretation, plan, research, analysis or recommendation and conclusion furnished as part of the work or otherwise communicated by any member of Bridgeport (Eromanga) Pty Ltd at any time in connection with the present study are opinions based upon inferences from measurement and empirical relationship and assumptions, which are not infallible, and with respect of which professionals in the industry may differ.

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1. PERMIT OVERVIEW

Petroleum Exploration Permit ATP 794B issued under the 1923 Petroleum Act (Queensland) is held by a Joint Venture comprising the block operator, Bridgeport (Eromanga) Pty Ltd, (Bridgeport) and Victoria Oil Exploration Pty Ltd (Table 1).

Area	JV Partners	Interest (%)
ATP 794B	Bridgeport (Eromanga) Pty Ltd	65% Operator
	Victoria Oil Exploration Pty Ltd	35%

Table 1: Licence Work Program Status

The license is in the second year of the term and expires on 31st October 2015.

ATP 794 2nd Period Renewal (1 Nov 2013 – 31 Oct 2017)			
Year	**Work Program**	**Indicative Expenditure**	**Status**
Year 1 (ending 31-10-14)	G & G data review	$50,000	Completed
Year 2 (ending 31-10-15)	Acquire 50 km 2D seismic data	$500,000	Completed
Year 5 (ending 31-10-16)	Drill 1 well	$2,000,000	Remaining
Year 4 (ending 31-10-17)	G & G data review	$50,000	Remaining

Table 2: Joint Venture Interest in ATP 794B

ATP 794 is located in the Cooper-Eromanga Basin in southwest Queensland. The tenement is 235 km southwest of Longreach, 223 km northeast of the Qld-SA border (Haddons Corner) and 1,025 km WNW from Brisbane (Figure 1).

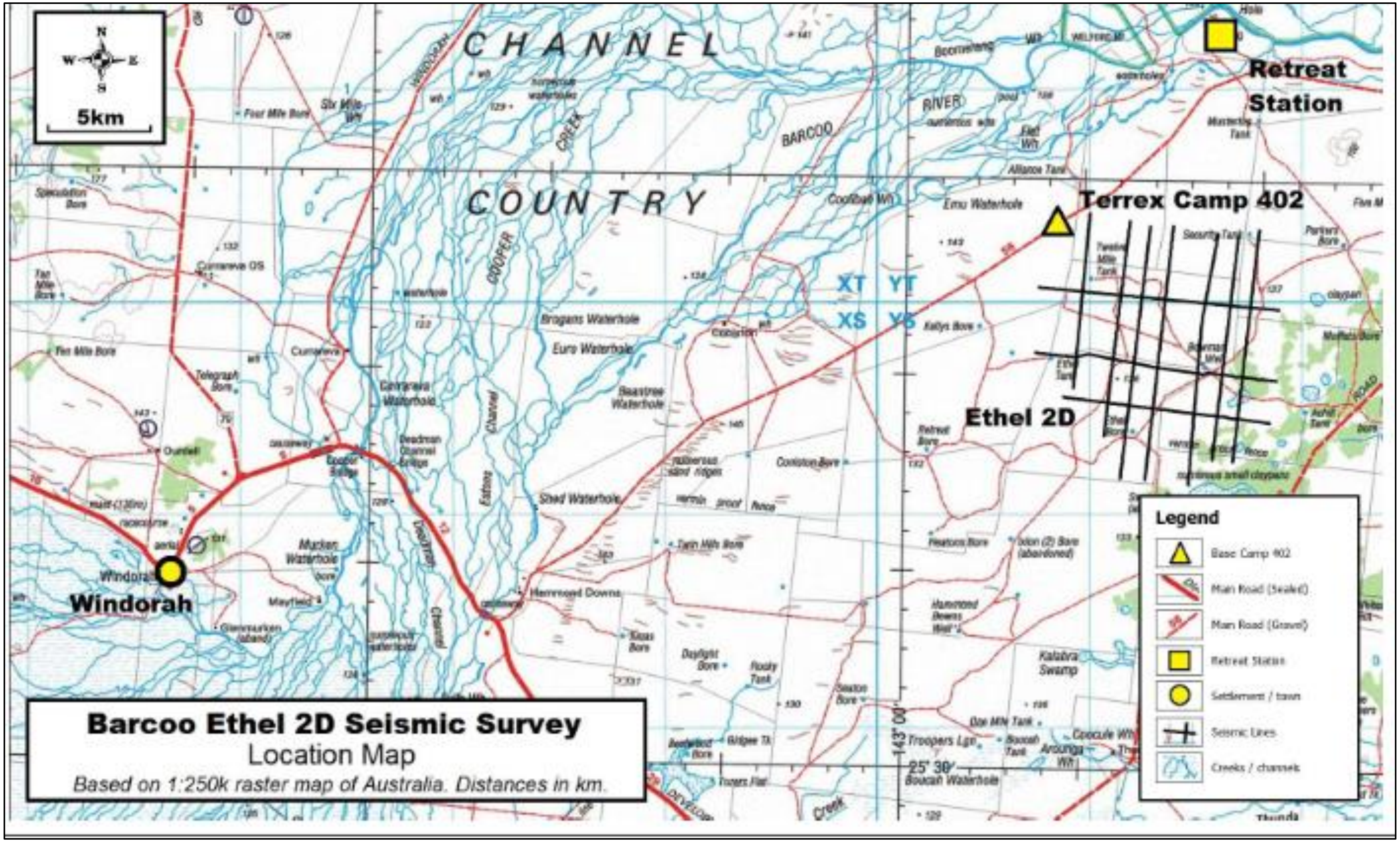


Figure 1: Location Map of Ethel 2D Seismic Survey

2. BASIN SETTING AND ARCHITECTURE

The Cooper and Eromanga Basins are both intra-cratonic basins. The Cooper Basin immediately overlies the Cambrian-Ordovician meta-sedimentary rocks of the Thomson Fold Belt and contains Permian to Middle Triassic non marine sedimentary rocks. The temporal relationship between the basins is shown in Figure 3

The intracratonic Cooper Basin represents a Late Carboniferous to Triassic depositional episode terminated at the end of the Middle Triassic with widespread compressional folding, regional uplifts and erosion. It lies unconformably over early Palaeozoic sediments of the Warburton basin and is overlain disconformably by the central Eromanga Basin. Sedimentation began in the Coper Basin in the earliest Permian with deposition of Merrimelia Formation sediments, conformably overlying Tirrawarra Formation followed by Patchawarra Formation. Restricted distribution of lacustrine Murteree shale, deltaic Epsilon Formation, Roseneath shale and Daralingie Formation can be seen. The middle Permian is marked by the Daralingie unconformity. The Toolachee Formation fluvial coal bearing unit overlies the unconformity. The Late Permian- Early Triassic Arrabury Formation conformably overlies the Toolachee Formation. A north-west shift in the depocentre of the Cooper Basin is evidenced by the Tinchoo Formation partly overlying the Arrabury Formation and partly basement. A period of folding followed. Basalts intrude the Late Permian and Triassic rocks, mostly in the southern Cooper Basin in Queensland.

Renewed subsidence resulted in the formation of the Eromanga Basin and resulted in the deposition of fluvial-lacustrine formations including the Cuddapan (fluvial), Poolawanna, Hutton (fluvial), Birkhead, Adori (fluvial) and Westbourne. The Hooray sandstone contains both fluvial and lacustrine sequences and straddles the Jurassic-Cretaceous boundary. Paralic and nearshore marine deposition resulted in the deposition of the Cadna-owie Formation, followed by Toolebuc, Wallumbilla and Allaru shallow marine mudstones. Marine conditions regressed during the deposition of the Mackunda Formation, with overlying Winton Formation deposited entirely under fluvial-lacustrine conditions. Major folding followed deposition of the mid Cretaceous Winton Formation resulting in termination of sedimentation in the Eromanga Basin.

The main structural elements are shown in Figure 2. Three major depressions (Thomson, Ullenbury and Yamma Yamma) and one trough (Windorah) are separated by major anticlines (Windorah, Mount Howitt, Durham Downs, Harkaway and Chandos) also marked by two major synclines (Thomson and Cooper) and one major ridge running north-south (Canaway Ridge).

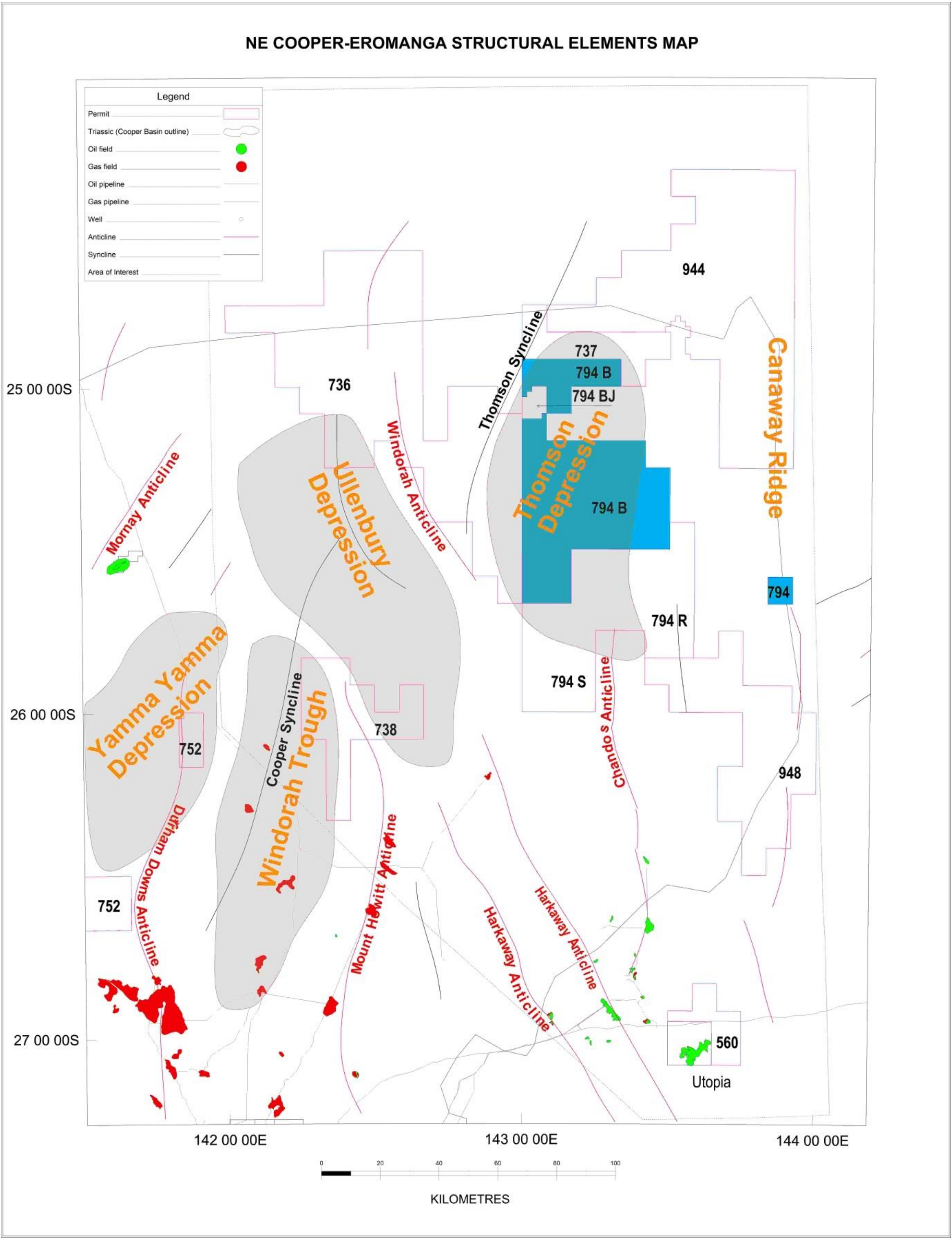


Figure 2: North East Cooper Basin Structural Elements

3. COOPER-EROMANGA STRATIGRAPHY

At about 298 Ma, commenced the first sedimentation (Merrimelia Formation, oldest of the Gidgealpa Group) within the latest Carboniferous to earliest Permian, deposited by cold, icy rivers during a period of glaciation, overlain by fluvial, glacial outwash (Tirrawarra Sandstone). The climate warmed such that peat swamps developed around 295-275 Ma, within and beside large rivers, resulting in widespread coal measures (Patchawarra Formation, one of the main hydrocarbon sources). A sealing cover of fine-grained, mainly lake deposits (Murteree Shale) followed. The subsequent formations reflect a switching from quiet, fine-grained, lacustrine deposition to higher energy sedimentation during the next 5 Ma (coal-bearing, sandy and deltaic Epsilon Formation, Roseneath Shale and deltaic Daralingie Formation). Following the Daralingie was an unconformity lasting approximately 5 Ma (non-deposition/erosion) upon which sedimentation by meandering river systems ensued, emplacing fairly thick, interbedded sequences of coals and sandstone (Toolachee Formation, youngest formation in the Gidgealpa Group, also a significant oil and gas source).

Towards the end of the Permian (252 Ma) floodplains with ephemeral lakes developed, drying out in higher ground with soil horizons forming exposed red beds (Arrabury Formation, base of the Nappamerri Group). Due to a north-westerly shift in the location of the main depocentre of the Cooper Basin, the fluvial Tinchoo Formation overlies the Arrabury partly and basement in other areas. A period of folding ensued and basalts intruded Late Permian and Triassic rocks in the southern portion of the Cooper Basin in Queensland.

The Eromanga Basin sediments began to form in conjunction with renewed subsidence in the region. In a restricted area, a floodplain to meandering fluvial unit, the Cuddapan Formation was deposited unconformably over the Permian sediments, in the Late Triassic (218-205 Ma). Unconformably overlying are thick sequences of Jurassic to Early Cretaceous (205.5-90 Ma) continental sandstones, siltstones and mudstones, forming stacked reservoirs and seals containing predominantly liquid hydrocarbons in the numerous small to medium sized fields.

The Poolowanna Formation at the base of the Jurassic is a fluvial to lacustrine unit conformably overlain by the prolific, good quality, reservoir sandstone of the fluvial Hutton Sandstone. The Birkhead Formation is a mainly fine-grained back swamp, lake to fluvial formation with volcaniclastic input, containing varying amounts of sandy lenses. Unconformably overlying is the thin Adori Sandstone which passes up into the generally fine-grained, thinly interbedded shaly to silty Westbourne Formation, with minor sand. At the end of the Jurassic, straddling the boundary with the Early Cretaceous is the Namur Sandstone deposited by higher energy rivers and overlying conformably is the fairly thin Murta Formation variably formed by sediments laid down by small distributary rivers, streams and overbank areas emptying into shallow lake systems and floodplains.

Towards the end of the Murta, a marine transgression occurred, initiating marine conditions. The Cadna-owie Formation represents the first marine sedimentation since the Devonian. The formation is capped by a thin, sandstone, the Wyandra Member, a regionally, easily recognized seismic marker “C” horizon. Marine sedimentation continued with the thick, highly interbedded Wallumbilla Formation, the Allaru Mudstone (during rapid subsidence) and overlying Toolebuc Formation, thin, with very a distinctive, high gamma log character. The Mackunda Formation marked the end of the marine conditions (contains dinosaur fossils) and the Winton Formation was deposited entirely under terrestrial conditions and was significantly affected by uplift and erosion.

Following the Mid to Late Cretaceous Winton Formation there was major folding and the whole Eromanga Basin was deformed by widespread contraction, followed by erosion and weathering. Structural changes that occurred in the Cainozoic, and the sedimentation and deep weathering strongly influenced hydrocarbon generation and migration. Above the unconformity, eroded remnants remain of quartzose sandstone, pebbly and sandy conglomerate, siltstone and mudstone of the Early Tertiary Glendower Formation. Following its deposition there was a period of stability resulting in deep and widespread weathering forming laterite and silcrete surfaces in the Oligocene (38-29 Ma) which was followed by warping and folding, resulting in the formation of localized small basins. Quaternary deposits are composed of dune, alluvium and ephemeral lacustrine sediments (due to a change to a more arid climate) which are now forming in the Channel Country of SW Queensland and are mainly dominated by mud, with very thin fine-grained sand lenses.

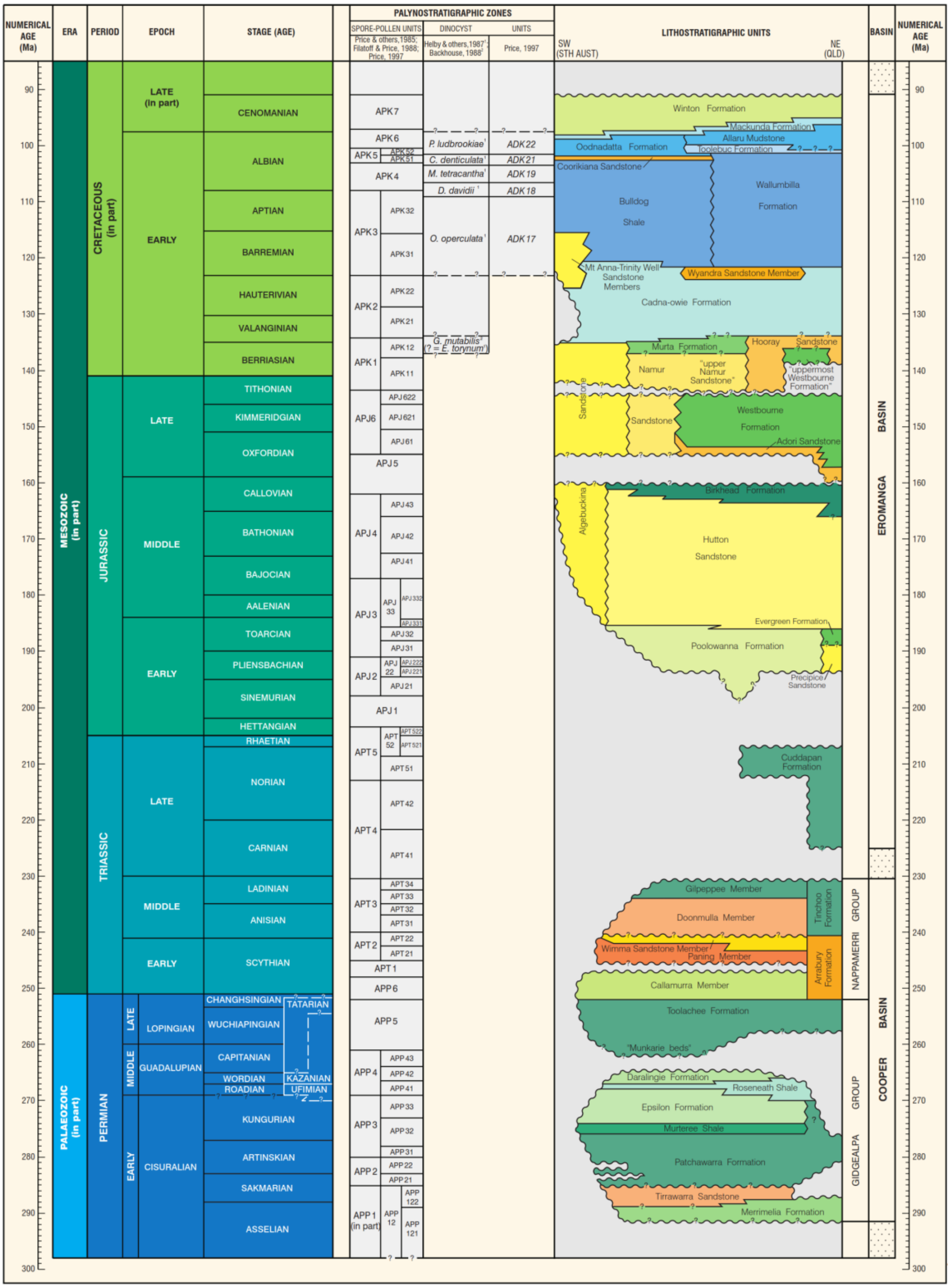


Figure 3: Late Palaeozoic-Mesozoic chronology and stratigraphy of the Cooper and Eromanga Basin (From Draper et al., 2002)

4. PETROLEUM SYSTEM

The events chart as shown in **Error! Reference source not found.** shows the relationship etween the essential elements and processes as well as the preservation time and critical moment for the Northeast Cooper-Eromanga Basin. The three principal petroleum systems in the study area consist of the following source/reservoir couplets: (1) Cooper-sourced and reservoir (2) Cooper-sourced and Eromanga-reservoired (3) Eromanga-sourced and reservoir.

Access to a main migration fairway fed from predominantly Permian sources is the main factor controlling distribution of Eromanga Basin oil accumulations. However, it is apparent that the conifer-related source signature is pervasive in the Mesozoic reservoirs indicating that other factors such as Mesozoic source richness and maturity determine the extent of the Eromanga input to oils of mixed origin.

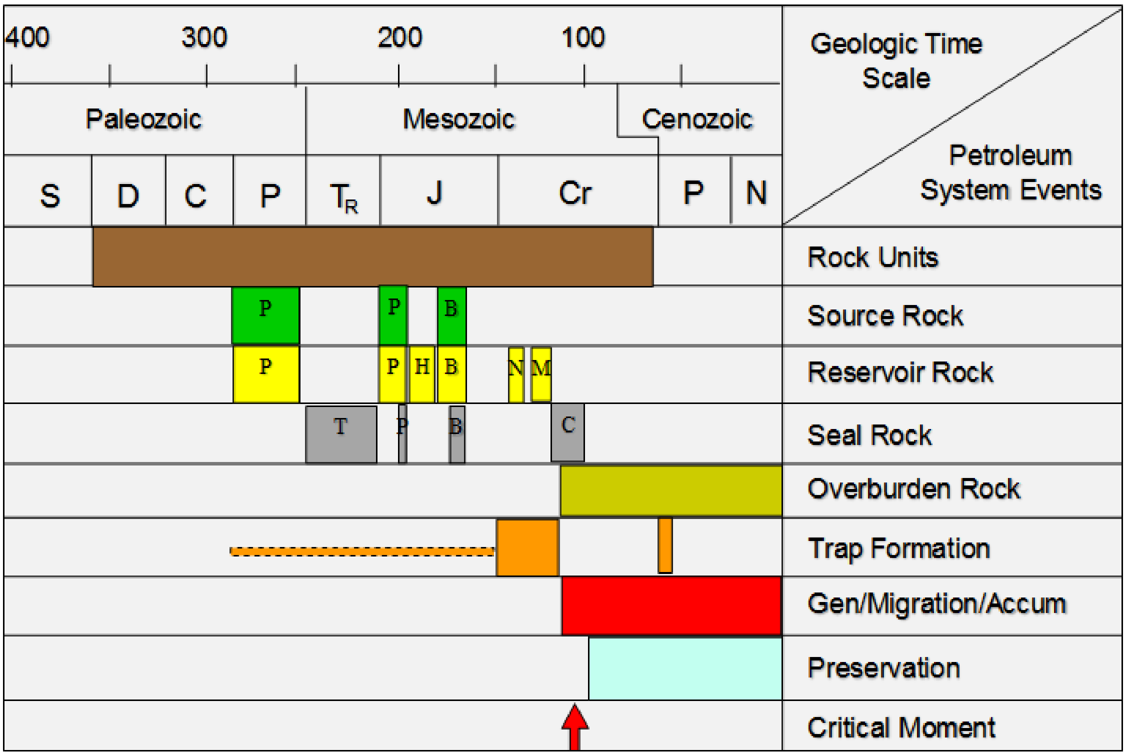


Figure 4: North East Cooper-Eromanga Petroleum System Events Chart (after Magoon and Dow, 1994).

5. 2D SEISMIC ACQUISITION

2D Seismic survey consisting of 10 lines ranging in length from 8.25 km to 12.0 km, totally 108.57 km was conducted in October 2013 by Terrex Seismic (Figure 5). The acquisition parameters are shown in Table 3.

2008 SERCEL 428- 24 BIT 2D SEISMIC DATA ACQUISITION SYSTEM	
Acquisition System	Sercel 428XL - 24 bit Telemetry system
Energy Source	3 x Hemi 60 Buggy Mounted Vibrators
Vibrator Point Interval Vibrator array	30 m
Vibrator Point Interval Vibrator array	3 on- line, 12 m pad - pad; 24 m array length
Vibrator Point Interval Vibrator array Location	centred mid-way between VP station
Geophone	30 m
Geophone Interval	centred on station pegs
Geophone Array location	30 m; (12 phones, 2.5 m spacing)
Sweep Length	8.0 sec
No of Sweeps	2 (standing sweeps; no move up)
sweep Type	mono sweep
Sweep frequencies	5-100 Hz
Peak force	61,620 lb
Hold down weight	46,140
Vibrator Drive Level	Force Control on - 75% peak force
Phase Lock	Ground force phase lock
No of Channels	240
Fold	120
Record Length	3.0 secs
Sample Rate	2 mS
Output Data Format	SEGD

Table 3: 2D Seismic Acquisition Parameters

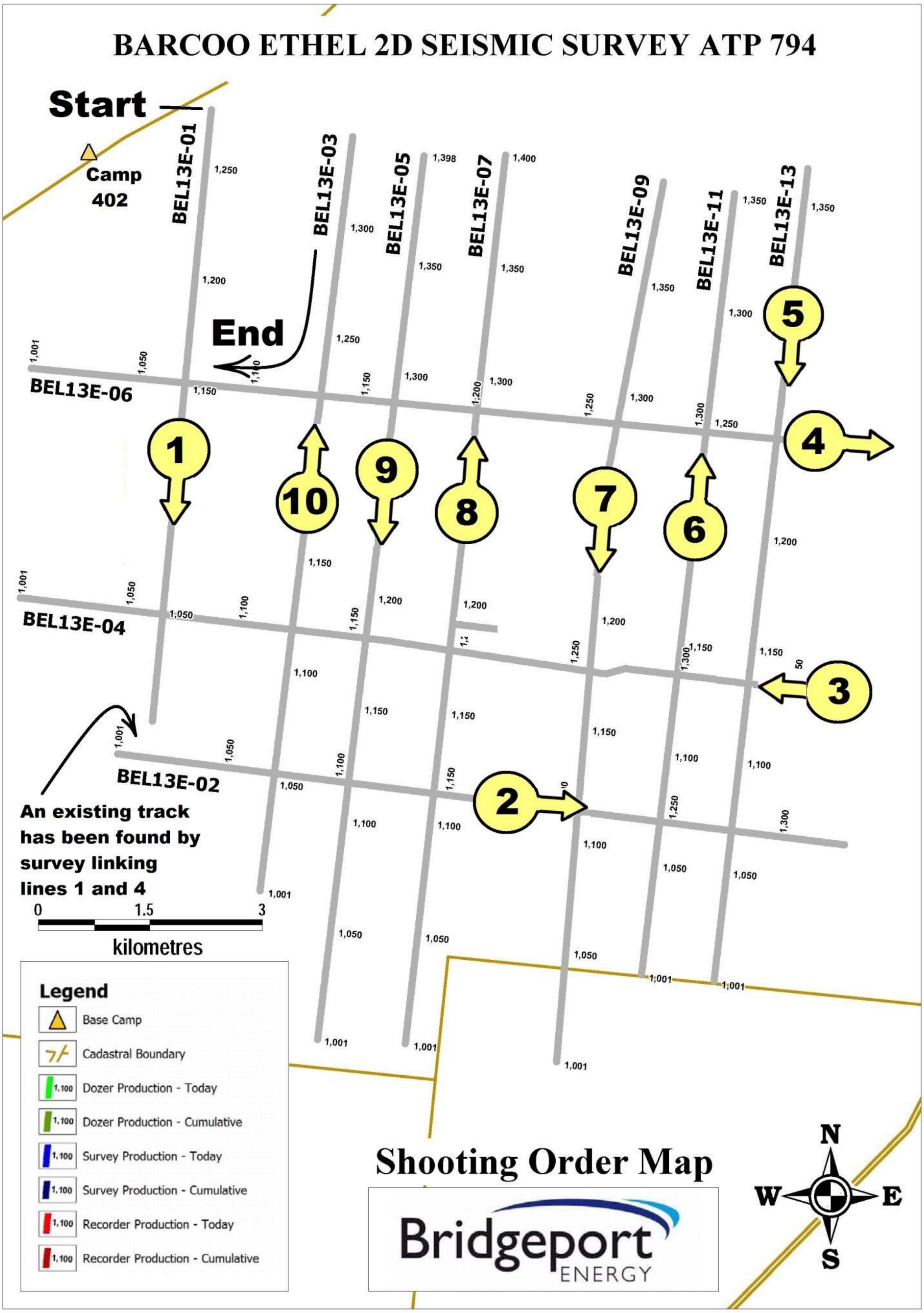


Figure 5: Acquisition Map for Ethel 2D Seismic Survey (showing order of recording)

6. 2D SEISMIC PROCESSING

2D seismic data processing was carried out by Velseis Processing Pty Ltd. in Brisbane, Australia from 2nd October 2013 to the 14th February 2014. In order to get better quality stack data, it was decided to reprocess the old vintage 2D data along with the newly acquired seismic data. The processing project consisted of: 10 lines of new Vibroseis data (108 line km, Ethel 2D Seismic Survey, see Figure 5) and 23 lines of dynamite data (277 line km, see Figure 6).

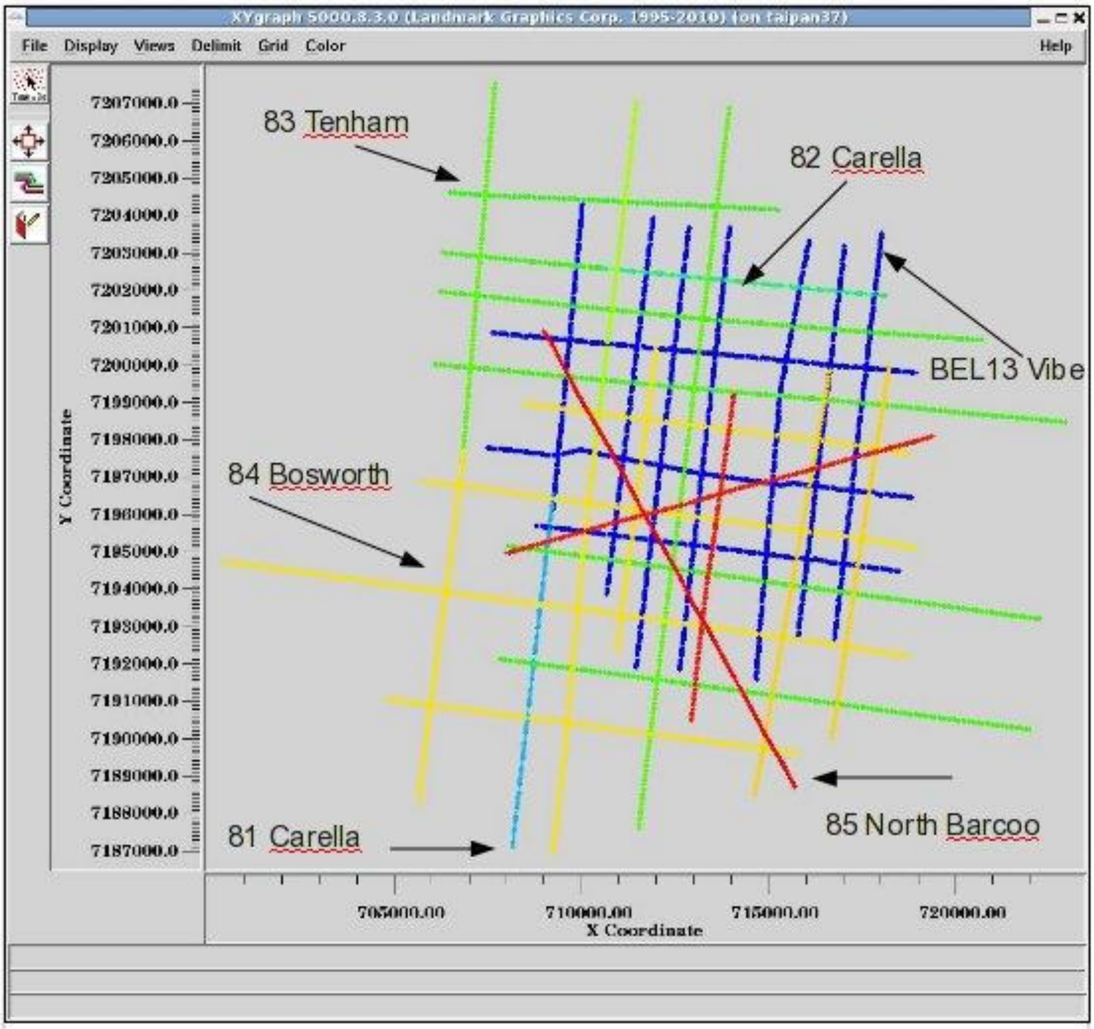


Figure 6: Reprocessing Map Showing All Seismic Coverage

7. 2D SEISMIC INTERPRETATION

7.1 Seismic Data Quality

Seismic data acquired is of good quality with satisfactory frequency contents as seen from the frequency spectra in Figures 7 and 8. Particular attention was given to statics issues (including shot hole information) as the presence of high velocity stringers in the near surface was identified. In order to effectively phase-match the Vibroseis and dynamite data, a 180º phase shift was applied to the Vibroseis data. The data was Pre Stack Time Migrated and the quality of the reprocessed data is of a good standard (Figure 9).

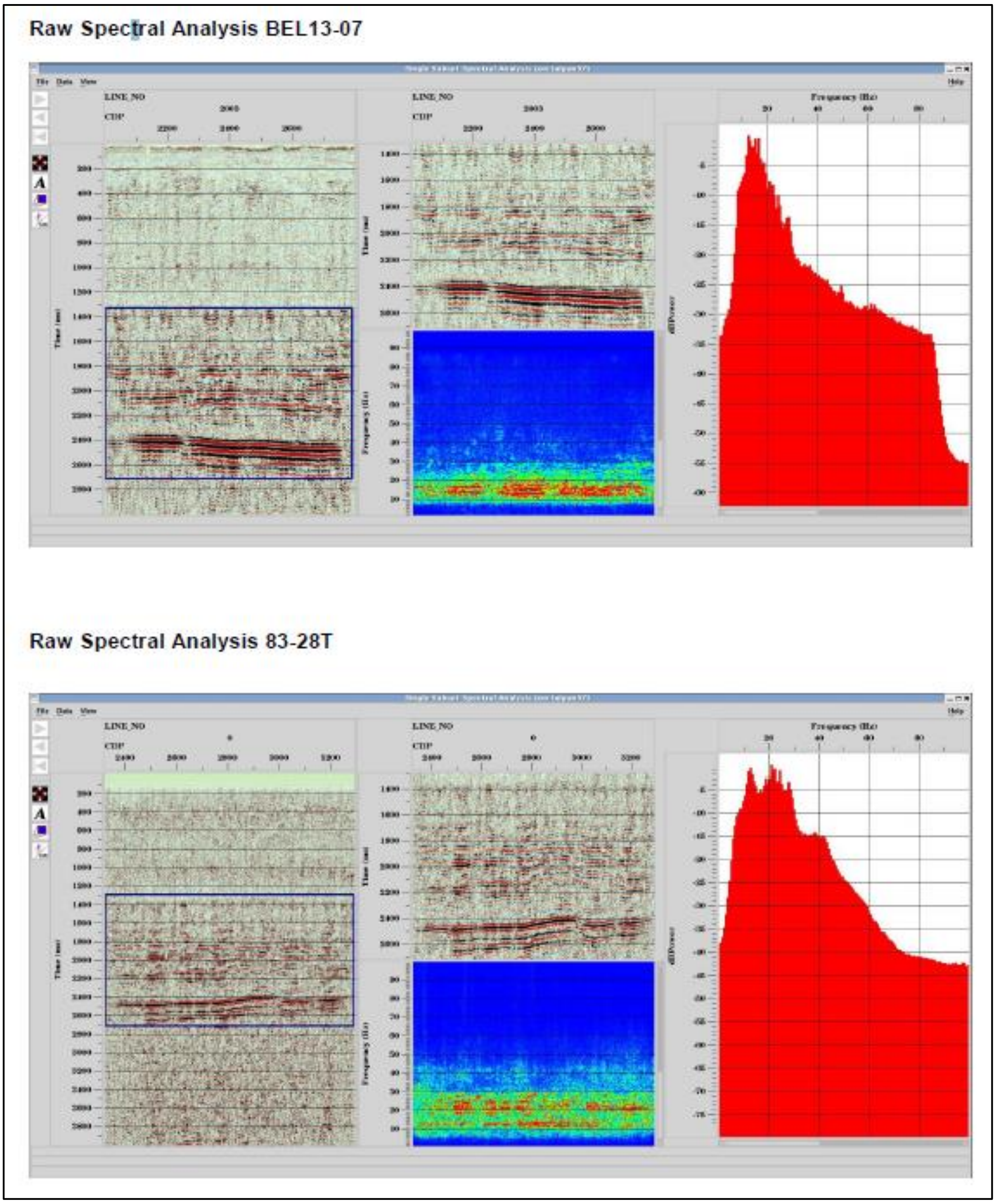


Figure 7: Raw Data Spectral Analysis

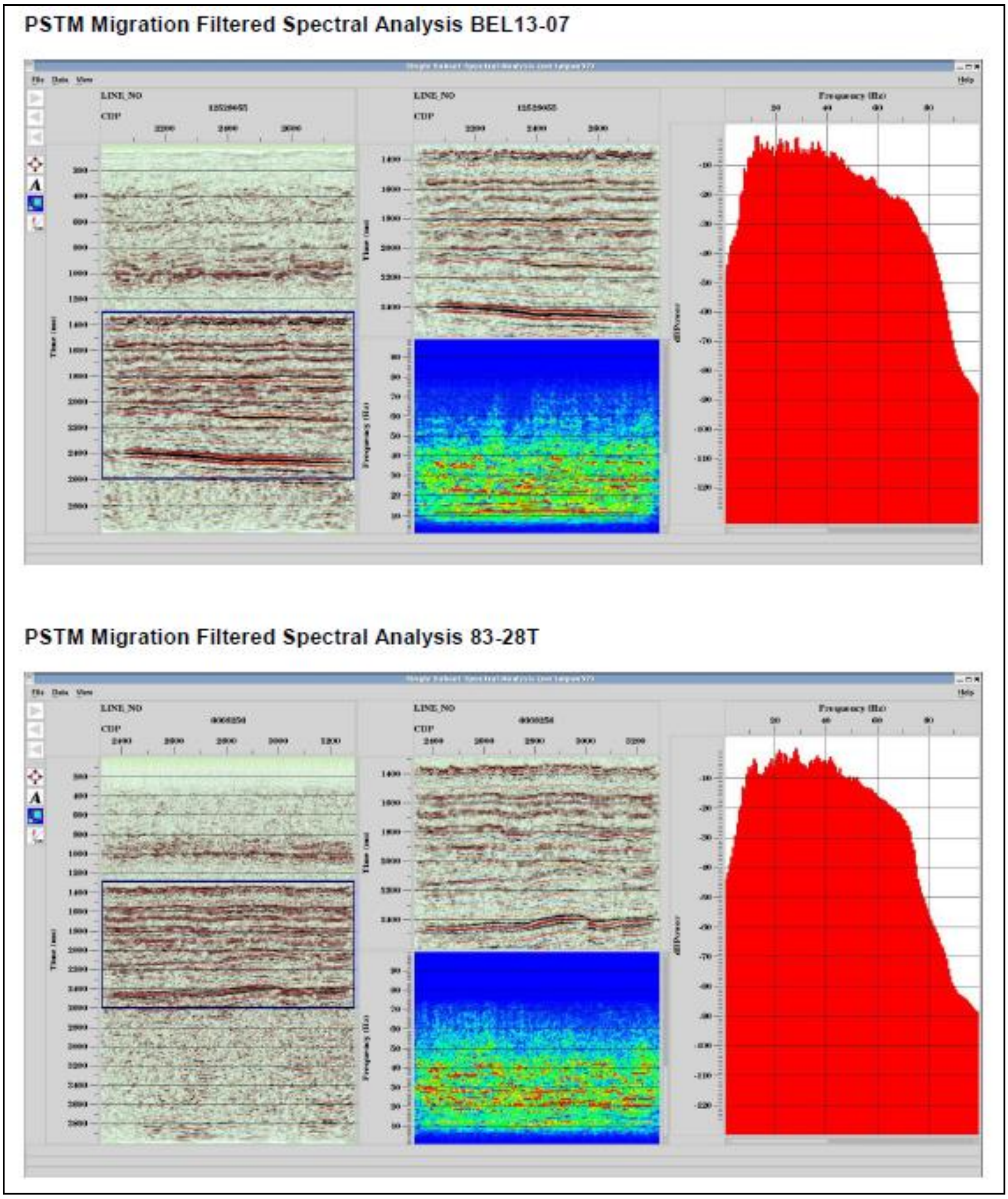


Figure 8: PSTM Filtered Spectral Analysis

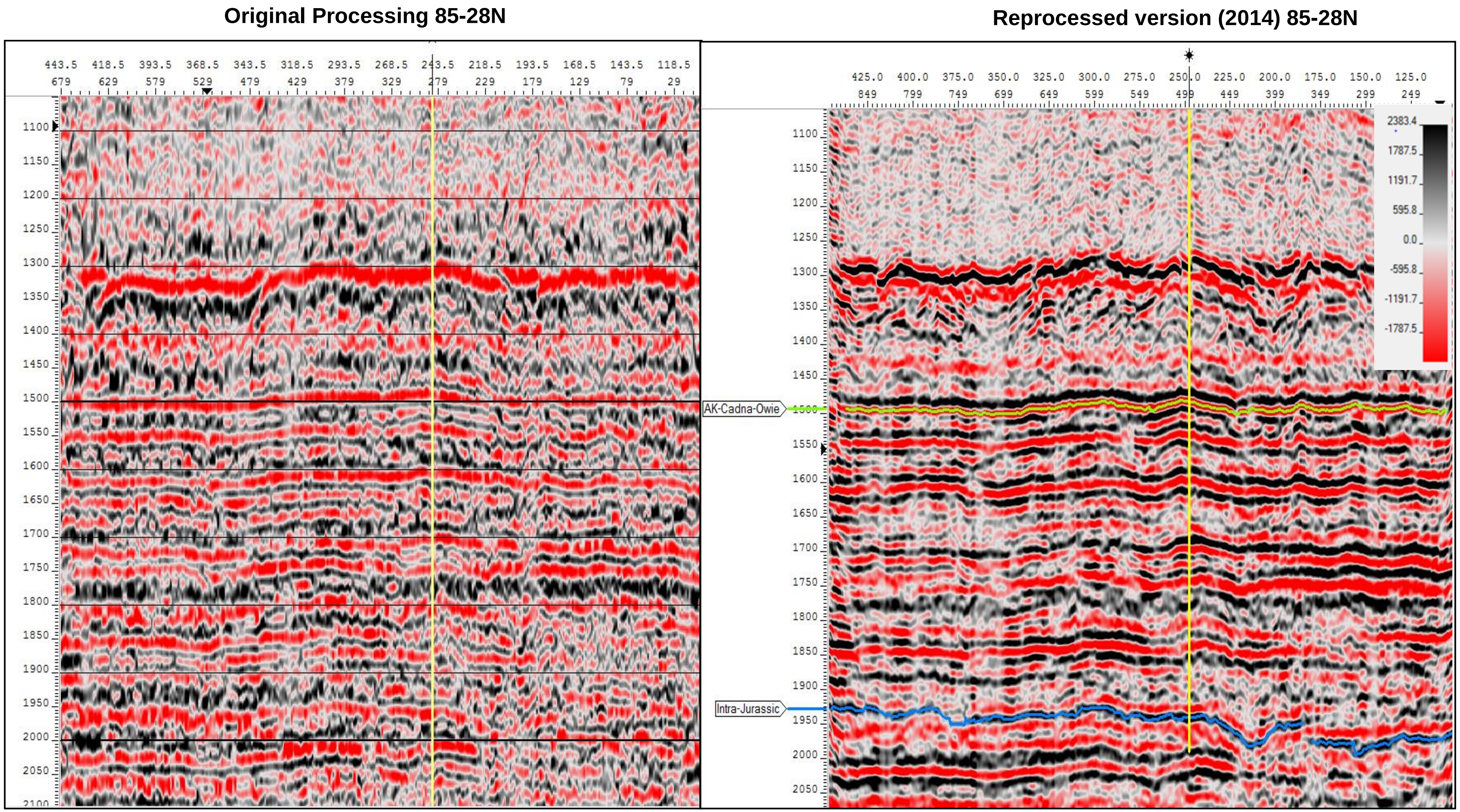
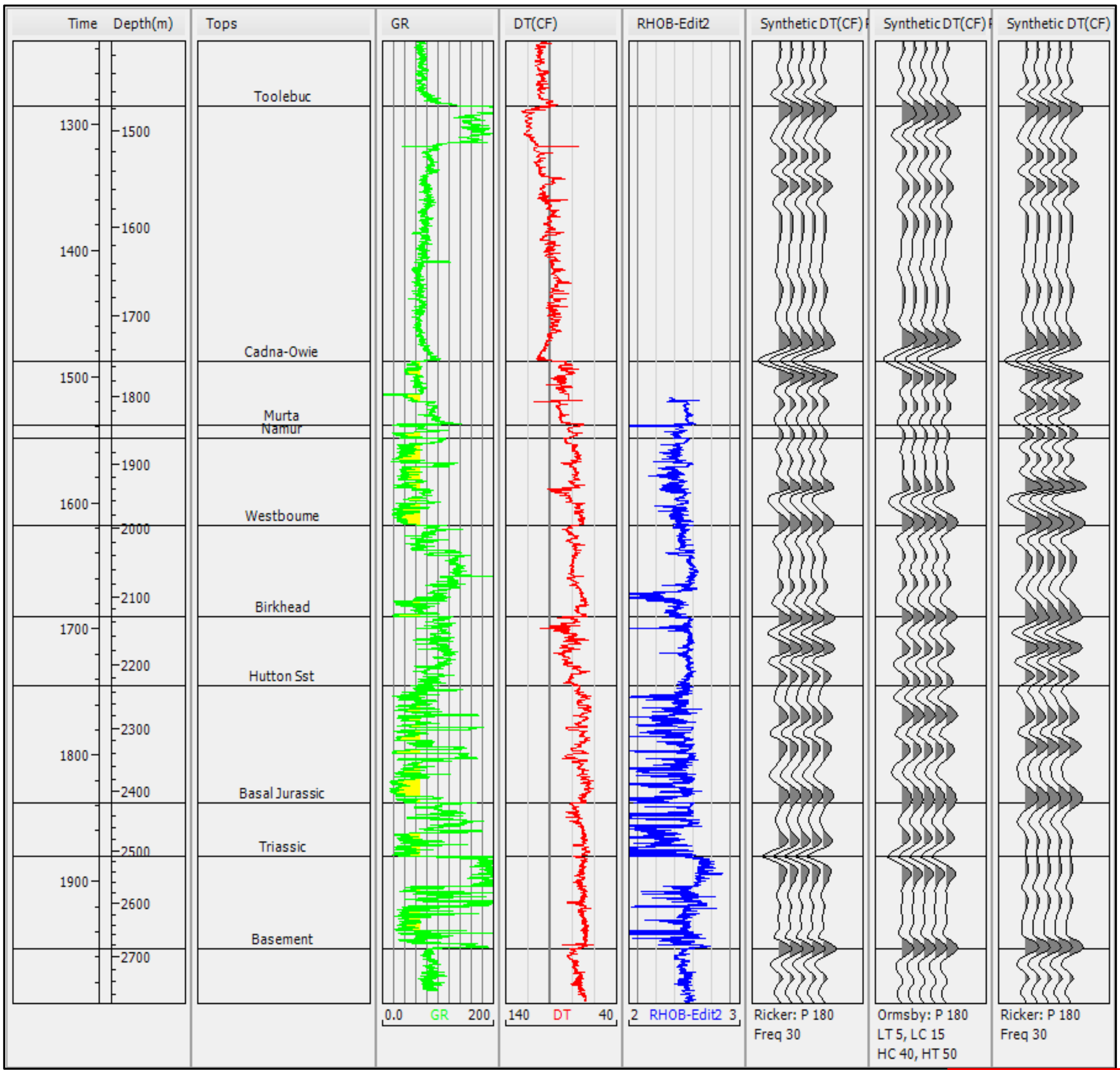


Figure 9: Data Quality Comparison After Reprocessing

7.2 Well Tie

The integrated sonic log in Ethel-1 well confirmed the tie between seismic time data with the well. Further validation is provided from the synthetic seismograph generated for Ethel-1. The match between the synthetics and the seismic section at the well is very satisfactory as illustrated in Figure 10 and Figure 11.



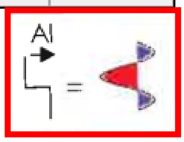


Figure 10: Synthetic Seismograph of Ethel-1 Well

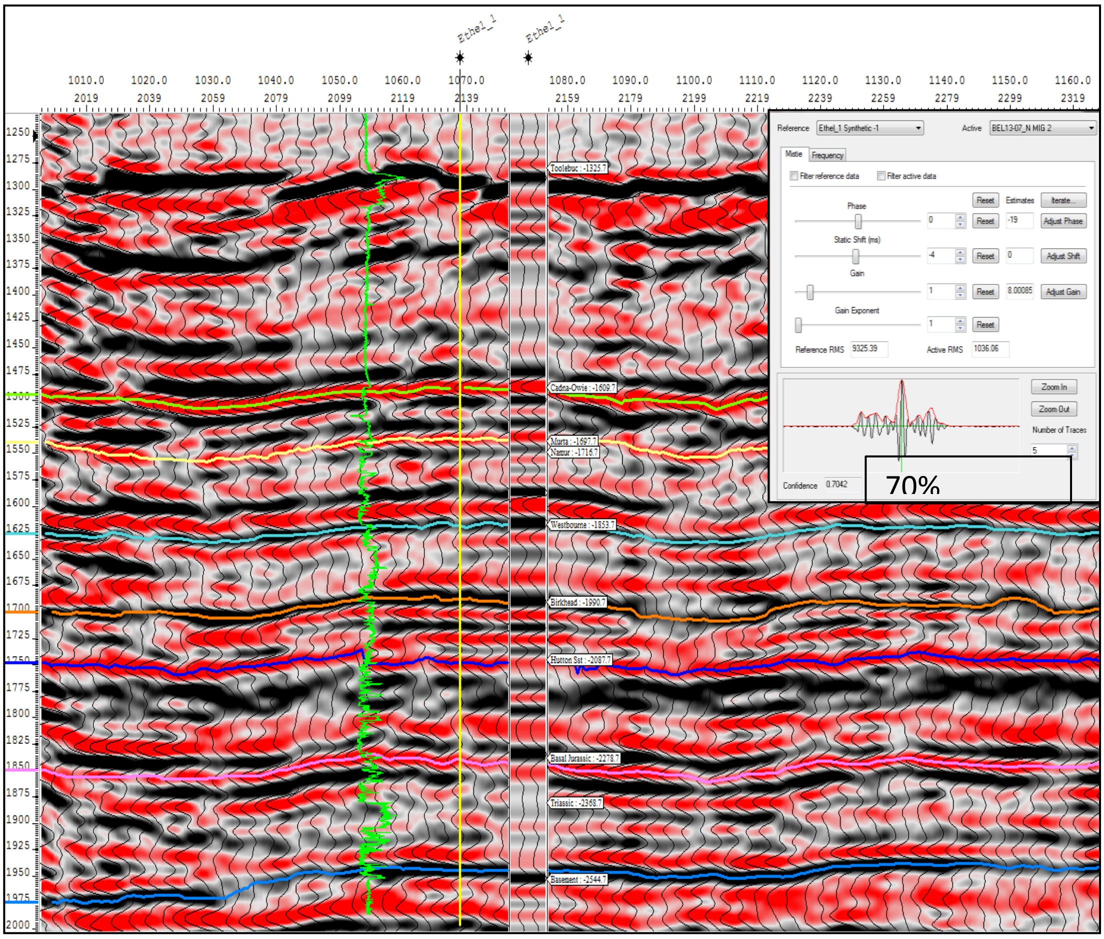


Figure 11: Synthetic Seismograph on Seismic at Ethel-1

7.3 Horizons of Interest

The primary reservoir zones of interest are Murta/Namur, Westbourne, Hutton and Poolowanna. The secondary target is Birkhead sands. Horizon time picking corresponding to the geological interface was undertaken. Picking was strictly guided by well to seismic tie through synthetic seismogram and check shot survey.

Formation	Comments	Seismic Picks
Cadna-owie	No shows	Trough- AI increase
Murta/Namur	No shows	Trough- AI increase
Westbourne	No shows	Peak- AI decrease
Birkhead	5% dull yellow pinpt fluorescence	Peak- AI decrease
Hutton	Trace of bright yellow fluorescence	Trough- AI increase
Poolowanna	5-10% spotty bright yellow fluorescence (DST 4)	Trough- AI increase
Basement		Peak- AI decrease

7.4 Mistie

No significant misties occurred between reprocessed vintage data and the newly acquired data. An arbitrary seismic cross section represents the cross cutting of different horizons across the survey area.

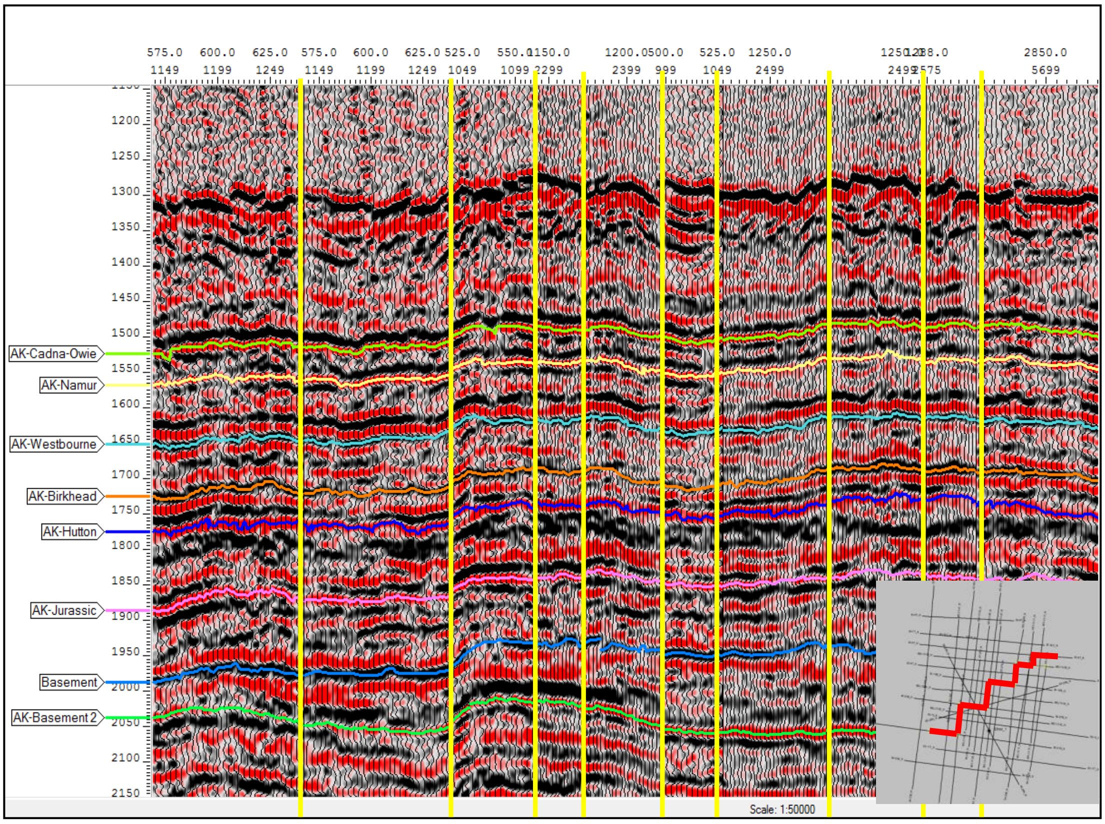


Figure 12: Arbitrary Line Showing Line Ties Across The Survey Area

7.5 Time Mapping

Reflection time picks of interpreted horizons were mapped using Petrosys software. Gridding was realised by using minimum curvature, bi-cubic interpolation method. The following time maps were generated.

- Cadna-owie
- Murta/Namur
- Westbourne
- Birkhead
- Hutton
- Poolowanna
- Basement

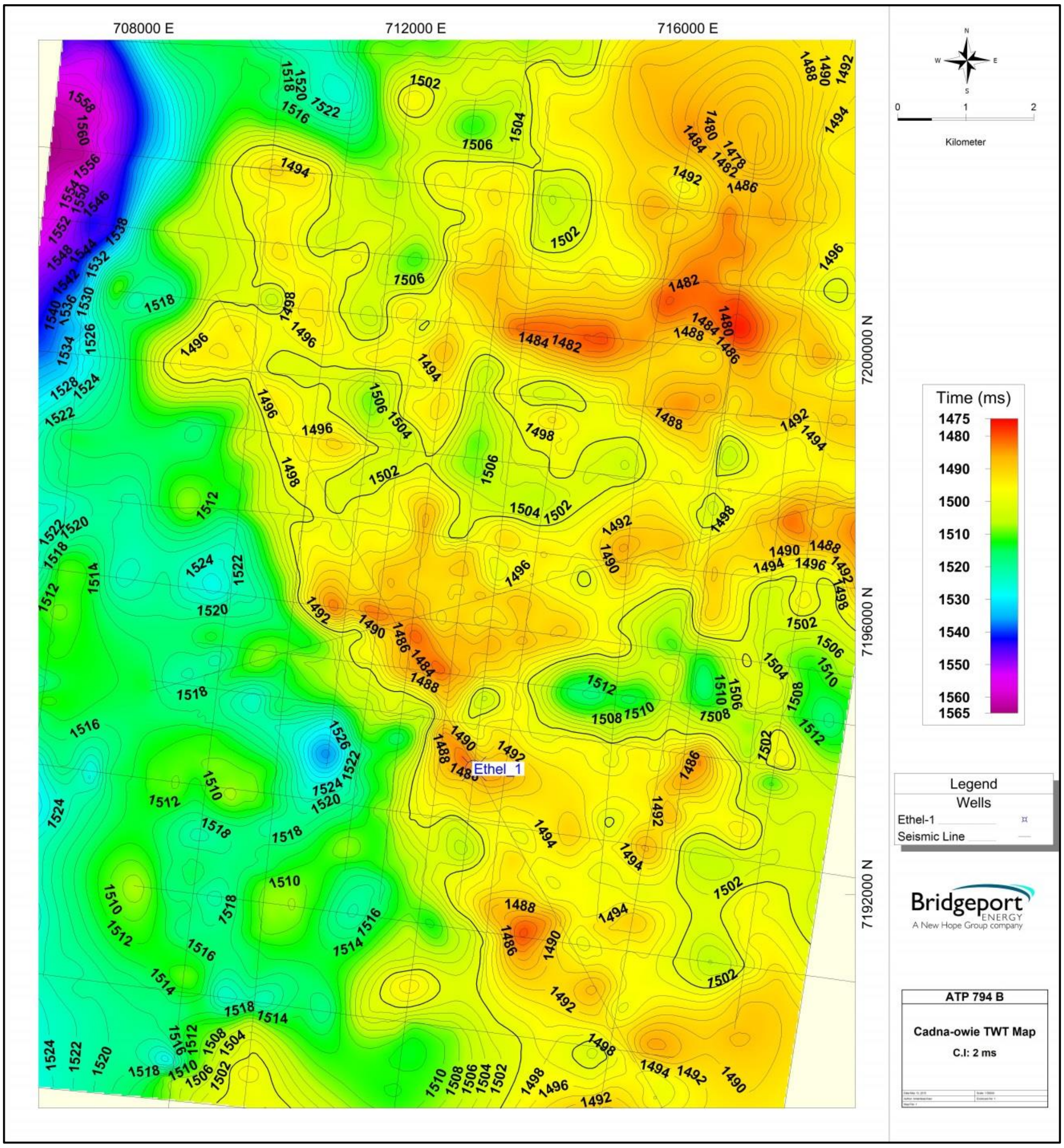


Figure 13: Cadna-owie TWT Map

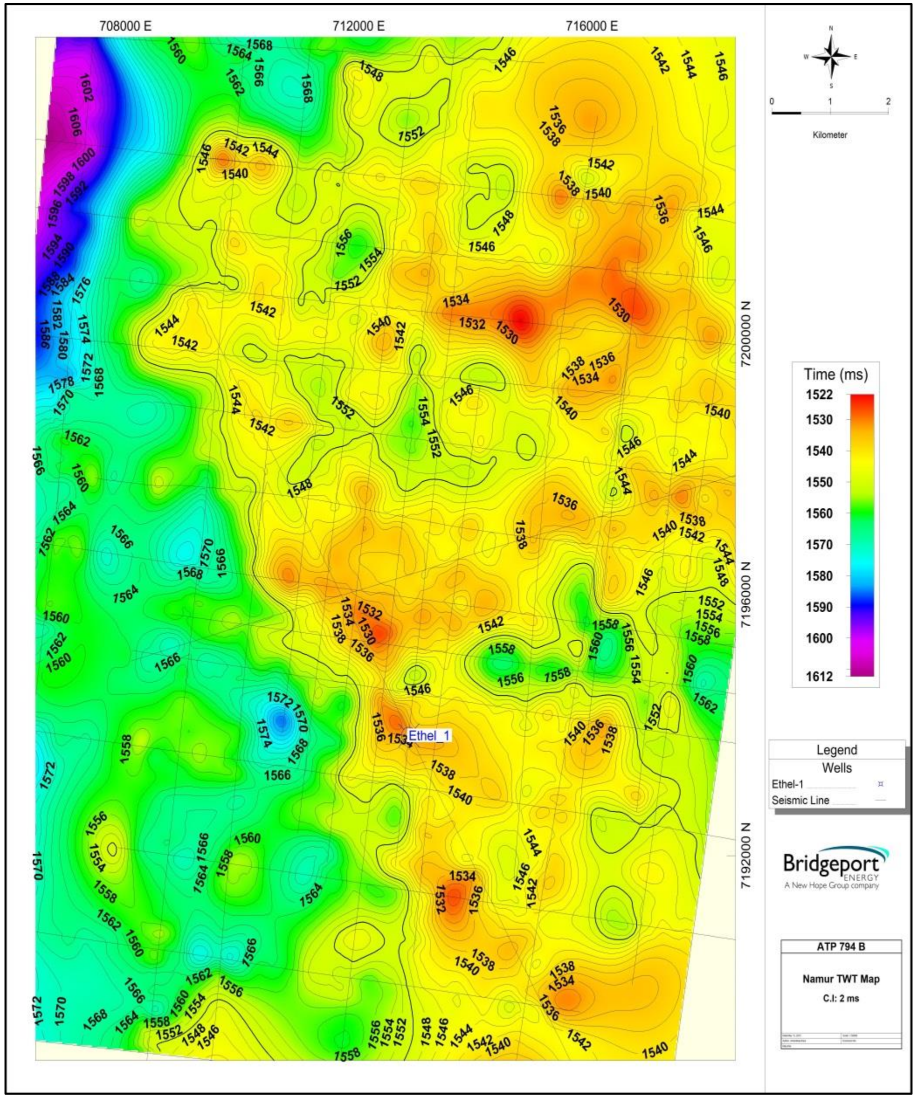


Figure 14: Namur TWT Map

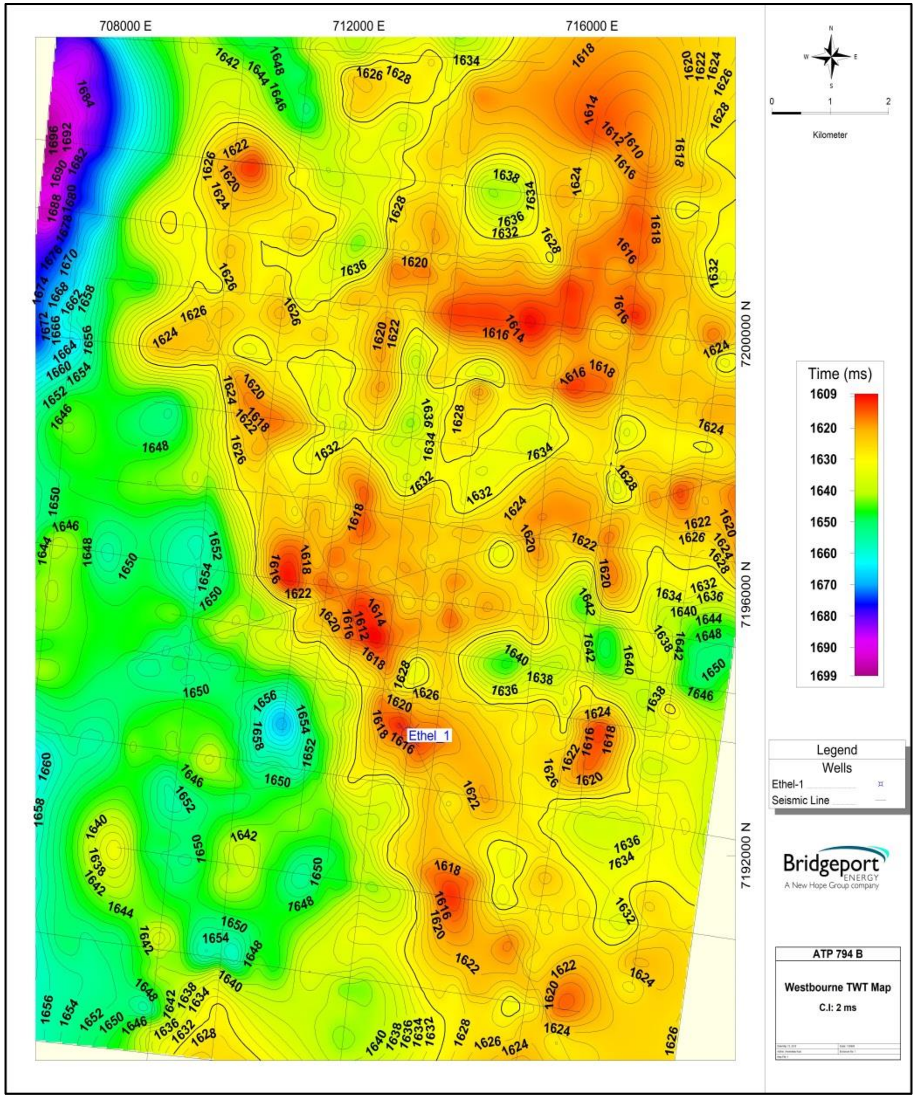


Figure 15: Westbourne TWT Map

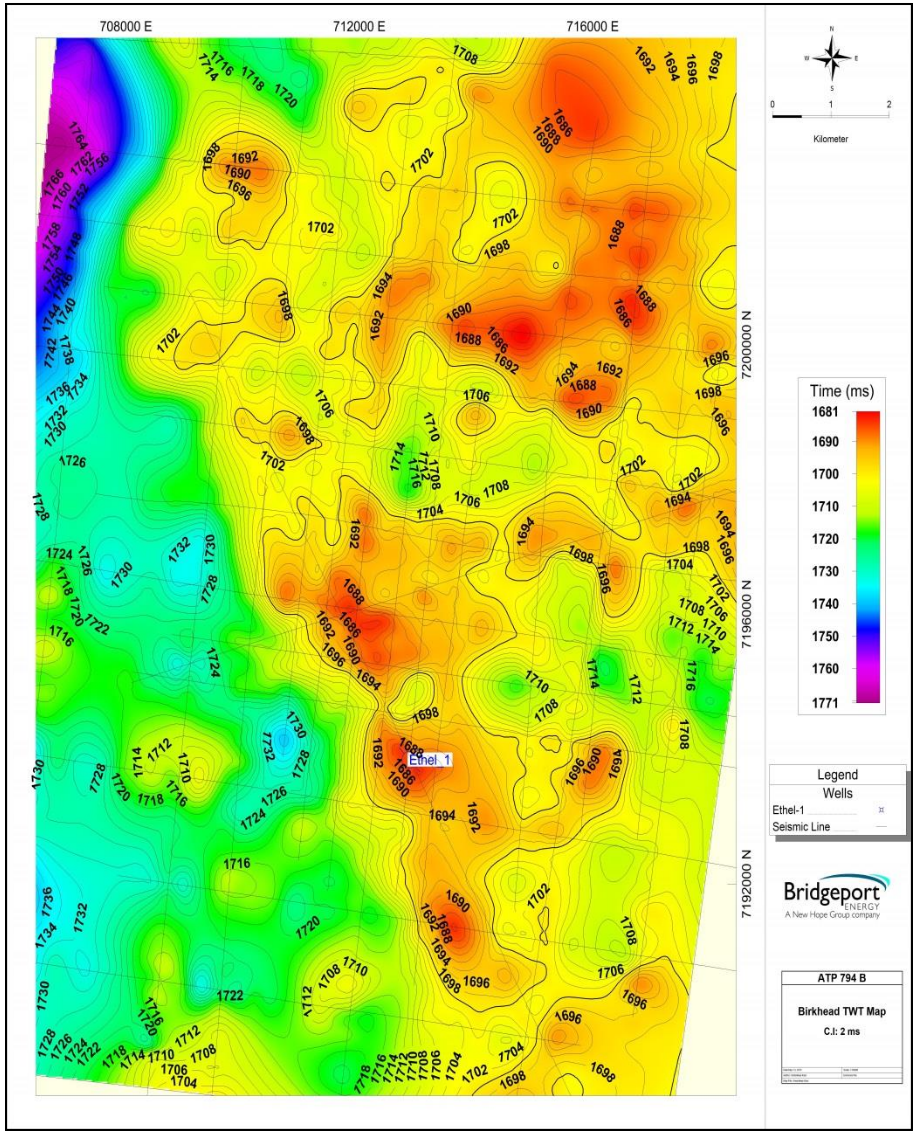


Figure 16: Birkhead TWT Map

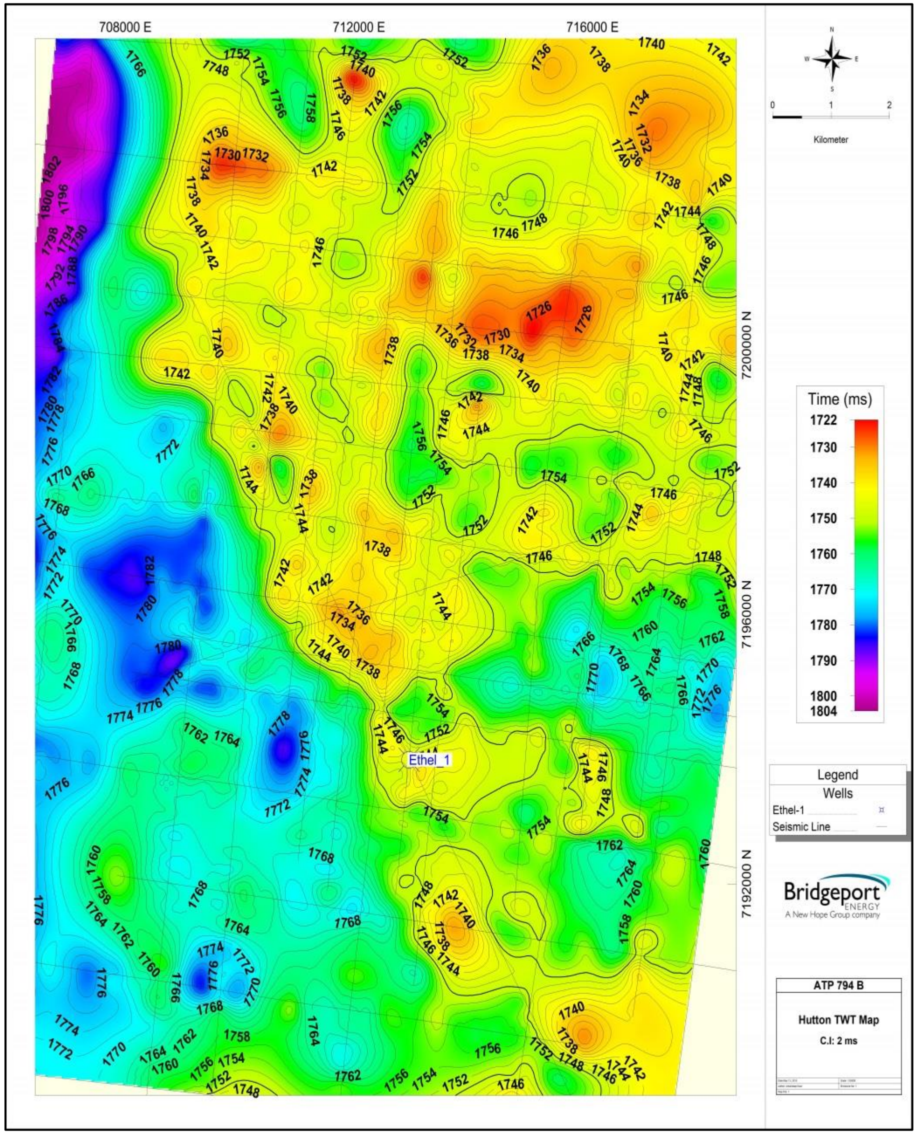


Figure 17: Hutton TWT Map

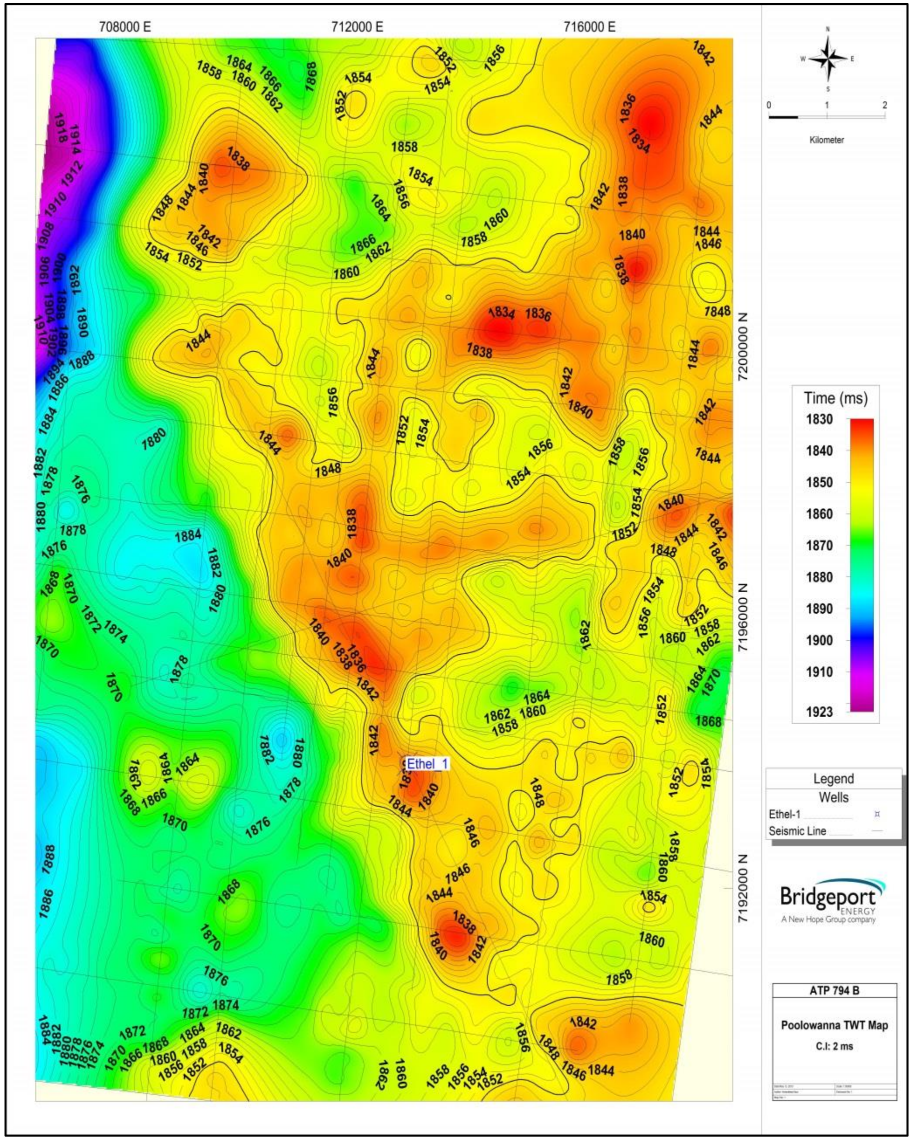


Figure 18: Poolowanna TWT Map

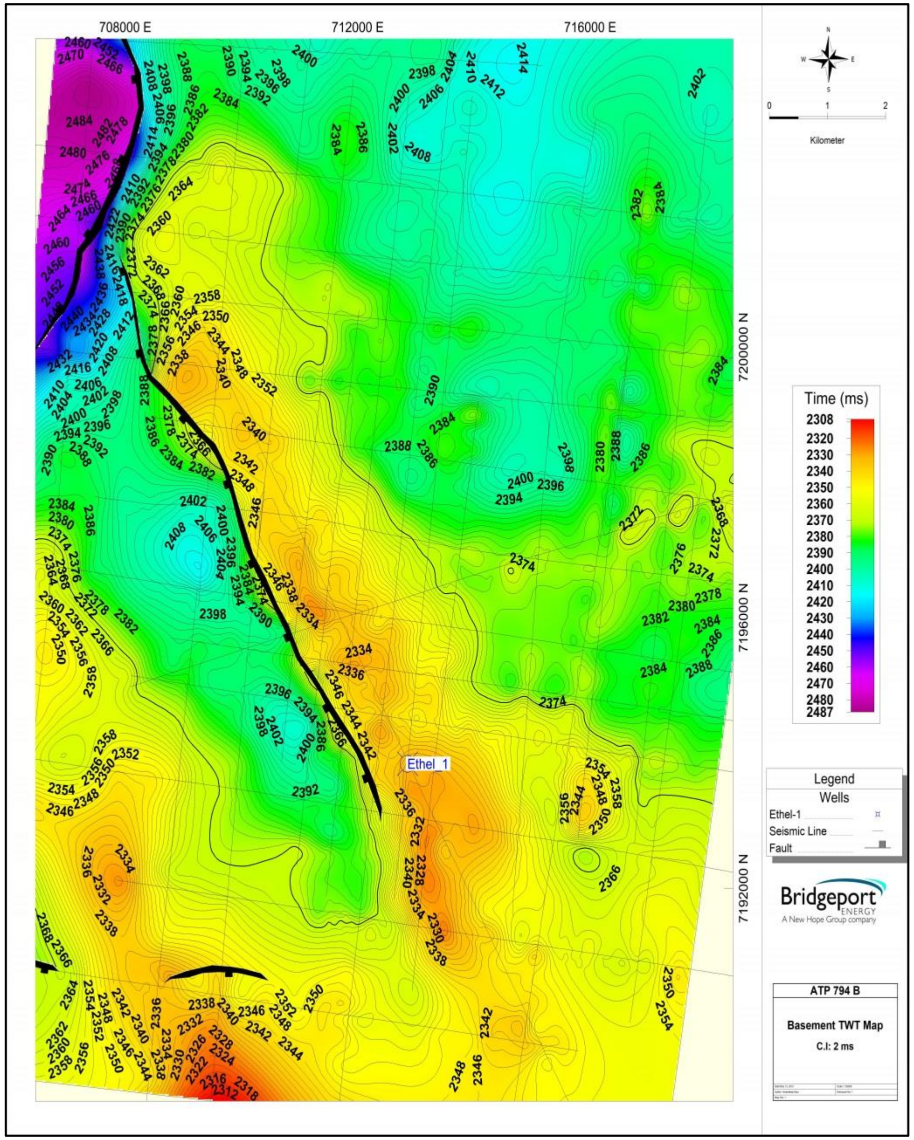


Figure 19: Basement TWT Map

8. CONCLUSIONS

- The aim of this work was to acquire high quality seismic data over the Ethel area of ATP 794B and integrate the data set with reprocessed vintage coverage in order to carry out detailed 2D seismic mapping.

- Good quality 2D seismic data covering 385 line kilometres was interpreted for structural and stratigraphic analysis and the identification of drilling targets in the Ethel area.

- The seismic data is deemed to be of sufficient quality that reasonably accurate structural maps were made, and a reasonable estimation of trap timing was ascertained. These data suggest hydrocarbon accumulations could exist in this area.

- Detailed study revealed Weak Leads which were structural higher than the high on which the Ethel-1 well was drilled.

- The paleo tectonic analysis indicated explicitly that local highs for the principal hydrocarbon reservoir were in place at time of onset of HC migration. All the local highs are away from the position of Ethel-1 well.

- Although the structural interpretation is likely adequate, there are uncertainties regarding source, migration and seal risk. There is also the potential that accumulations of oil may have been swept due to fresh water flushing. Limitations of the data and lack of well control make it difficult to mitigate these risks.

- Structural closures identified here are considered reasonably robust from a geophysical perspective but due to the inherent geological risks remaining, it is not advisable to drill another well until further technical studies are carried out.

- 2D seismic data, by its nature, is sparse and identification of any stratigraphic channels or “pinch-out” plays was not possible given this data set.