

EL8/2012  
Mt. St. Johns  
Year 1 Annual Exploration Report for the  
Period 22/10/2012- 22/10/2013

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## Abstract

EL8/2012 Mt. St. Johns lies in the Fingal-Avoca District in North Eastern Tasmania where coal has been mined since the 1880's from both opencut and underground mines exploiting coal seams hosted in the Triassic Upper Parmeener Supergroup of the Tasmanian Basin. Within EL8/2012, Imperial is exploring for modest size open-cut and larger underground thermal coal resources that are of sufficient quality to meet export coal specifications.

This report summarises the first year exploration program undertaken by geological consultants Global Ore Discovery (Global Ore) on behalf of Imperial. In this reporting year desktop analysis included literature reviews, remote sensing, land access notifications, geological and drillhole data compilation and cross section interpretation. Field work focussed on mapping of marker horizons, identification of new coal outcrops, relogging of historic drillholes and better positioning of historic drillhole collars and coal seam outcrops

Key findings were:

- ASTER satellite mineral mapping did not allow for desktop stratigraphic mapping due to dense vegetation cover, it did however help guide field mapping programs through identification of areas more likely to be outcrop.
- The Dalmayne Conglomerate marker horizon identified in historic drilling was able to be mapped in the field, and could provide important information on the 3D distribution of coal.
- New coal seam outcrops were identified that will add significantly to modelling of coal throughout the licence.
- Preliminary sectional interpretation indicates that there is potential for shallow coal resources to be identified in the St Paul River Valley.

Year 2 exploration will focus on further mapping of the Dalmayne Conglomerate marker horizon and on exploring for new coal outcrops. Both of these pieces of information will significantly and cost effectively add to the 3D understanding of the distribution of coal within the licence. Given that seams intersected in historic drilling are generally < 2m thick, small topographic inaccuracies may limit the evaluation of the economic viability of any coal strip ratio. The acquisition of a LIDAR DEM will be investigated to see if it will cost effectively assist in reducing these potential errors. A 3D geological model should be built (using digitally recovered historic seam and detailed lithological data) to assist in choosing locations for drillholes that maximise the definition of any potential open-pittable resources and test areas of high geological uncertainty.

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## 1. Introduction

The Fingal-Avooca District in North Eastern Tasmania was identified by Imperial Coal Pty Ltd (Imperial) through an Australian wide evaluation aimed at identifying high quality, under explored coal provinces. Coal has been mined from the Fingal-Avooca District since the 1880's from both opencut and underground mines, exploiting coal seams hosted in the Triassic Upper Parmeener Supergroup of the Tasmanian Basin. Currently, Cornwall Coal Company (a subsidiary of Cement Australia) is mining coal from the district and in September 2013, Hardrock Coal Mining Pty Ltd was granted a mining licence to extract coal from an underground mine development beneath the Fingal Tier.

Imperial's preliminary analysis of the openfile geological and geophysical datasets identified three core areas within the Fingal-Avooca district to undertake further exploration for coal resources. Applications were submitted to Mineral Resources Tasmania in in the first quarter of 2012 for three licences, including EL8/2012 which is the subject of this report.

EL8/2012 covers an area of 242.5 sq.km and is approximately 18.5km due south of Fingal Township (Figure 1). Access to the northern reaches of the licence is via the Valley Road from the Esk Highway or from the south via Royal George Road, Old Coach Road and McKays road. Rail is available approximately 23km to the north of the property via high quality dual carriage gravel forestry roads. The rail provides a valuable link to the export port of Bell Bay near Launceston some 180km to the north.

Within EL8/2012 Imperial is exploring for modest size opencut and larger underground thermal coal resources that are of sufficient quality to meet export coal specifications. This report summarises the first year exploration program undertaken by geological consultants Global Ore Discovery (Global Ore) on behalf of Imperial during the period 22/10/2012 to 22/10/2013.

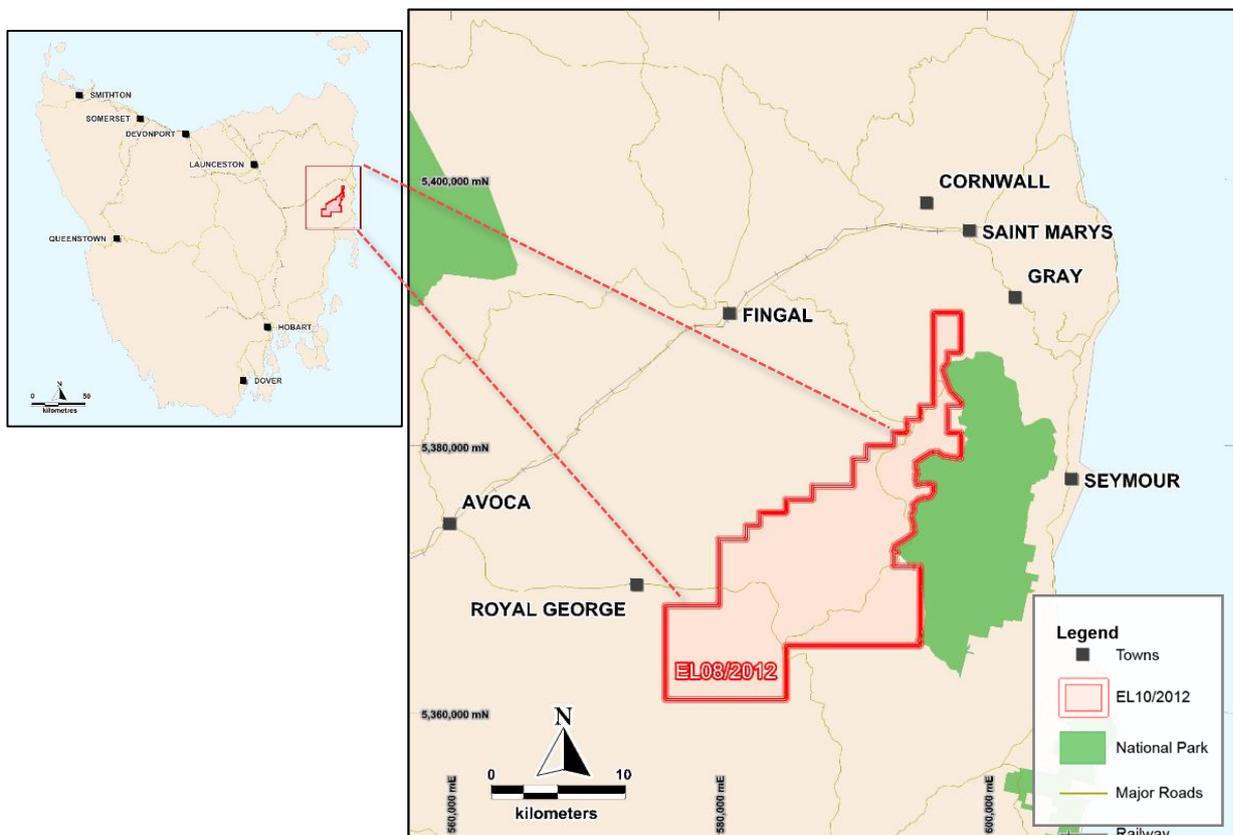


Figure 1 - Location overview of EL8/2012

## 2. Review of Previous Work

No previous work has been undertaken by Imperial on the EL8/2012.

## 3. Exploration Completed during the reporting period

### Literature Review

#### Regional Geology

Imperial is exploring for coal hosted within the Late Carboniferous to Late Triassic Tasmania Basin. The Tasmania Basin covers much of eastern and southern Tasmania and the current outcrop edge is dominantly erosional, indicating that the basin originally occupied much larger extents than the current >30,000 sq. km (Seymour and Calver, 1995). Sediments within the Tasmania Basin are generally flat lying (Stacey and Berry, 2004) and up to 1.5km thick (Seymour and Calver, 1995) and have been divided into two broad lithological/environmental associations, the Lower and Upper Parmeener Supergroups (Stacey and Berry, 2004). Both supergroups host subordinate coal units (Forsyth et al. 1974). The stratigraphic-tectonic elements for Tasmania is shown in Figure 2.

The Lower Parmeener Supergroup consists of glacial and glaciomarine shallow water sediments. The basal tillite units (which range up to 580m) are absent from the major highs in the Northern Tyennan Element and North East Tasmania Elements (Seymour and Calver, 1995). Subsequent to the deposition of these glacial sediments, carbonaceous pyritic siltstone followed by richly fossiliferous siltstones, sandstone and minor limestone up to 400m thick were laid down (Seymour and Calver, 1995). Deposition due to growth faults seems restricted to the Lower Parmeener Supergroup and is only a minor factor in basin development (Stacey and Berry, 2004). Thicker accumulations of the lower Parmeener Supergroup occupy a NNW orientated elongate depocenter which is spatially coincident with the NNW structural zone separating the Western and Eastern Tasmanian Terranes (Stacey and Berry, 2004).

The Upper Parmeener Supergroup consists of four lithological units of non marine sediments deposited in the Late Permian to Late Jurassic (Forsyth, 1989) and described in detail in Seymour and Calver, 1995. The first unit consists of well sorted, cross bedded sandstone and carbonaceous siltstones and mudstone with thin coal seams in the far southwest and in the northwest (Seymour and Calver, 1995). Thickness of the this unit varies from an average of 50m to maximum of 108m with the thickest sediments observed in the west (Seymour and Calver, 1995).

Unit two consists of predominantly well sorted quartz arenite between 200-300m thick, and is generally thinner in the north east of the basin (Seymour and Calver, 1995). Unit three contains quartz granule sandstone with minor conglomerate overlain by interbedded quartz sandstone, lithic sandstone and lutite and concludes with a quartz sandstone interbedded with carbonaceous lutite sandstone and local thin coal seams (Seymour and Calver, 1995).

The fourth unit contains all of Tasmania's economic coal reserves, these being mostly in the northeast (Bacon, 1991) where thickest preserved sections are observed (Seymour and Calver, 1995). This unit consists of lithic sandstone with lesser lutite and coal, with its greatest thickness preserved in the northeast (Seymour and Calver, 1995). Rare felsic tuff horizons are observed in the upper parts of this unit (Bacon and Everard, 1981), while elsewhere at similar levels rare conglomeratic horizons are observed, which include clasts from a calc-alkaline volcanic source (Seymour and Calver, 1995).

These units of the Upper Parmeener Supergroup are intruded by a large volume of tholeiitic dolerite, mainly as sheets and sills. Typically these bodies are 400-500m thick (Seymour and Calver, 1995). Only

limited areas of correlative extrusive rocks are observed in a graben at Lune River where Jurassic mudstones are also preserved (Seymour and Calver, 1995).

In the Cenozoic basalts were extruded throughout parts of northern and eastern Tasmania. Age dating indicates that volcanism ranged from Paleocene to late Miocene (Seymour and Calver, 1995). In North East Tasmanian Element (as defined by Sutherland and Wellman, 1986) a suite of basaltic flows with variable ages filled valley draining northward to Bass Strait.

Surficial Quaternary-aged deposits throughout Tasmania include glacial, slope, coastal, aeolian, fluvial and cave deposits. Colhoun 1989, provides further details on the regional distribution of the sediments.

# TIME - SPACE DIAGRAM FOR TASMANIA

Compiled by: D.B.Seymour and C.R.Calver  
VERSION 2 (31-03-1998)

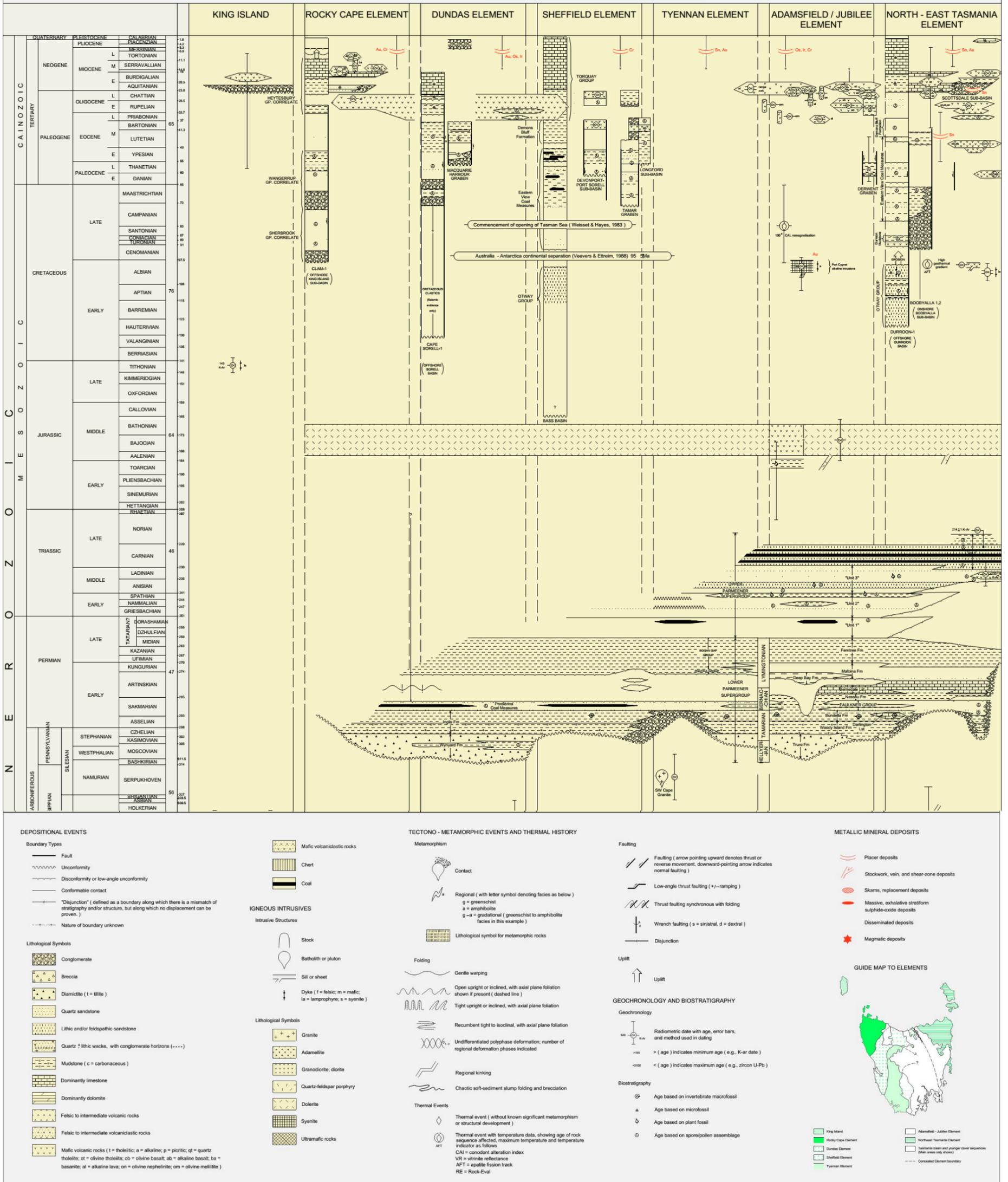


Figure 2 – Subset of Time-space diagram for Tasmania. EL8/2012 is situated closest to the North-East Tasmania Element (From Seymour and Calver, 1998)

## Local Geology and Historic Coal Exploration

Bacon, 1991 provides an excellent summary on the local geology, coal geology and historic coal exploration of the three major coalfields (Fingal, Dalmaine and Merrywood) adjacent to EL8/2012. Key aspects of historic coal exploration subsequent to Bacon, 1991 in or adjacent to EL8/2012 is summarised below (Table 1).

Table 1 - Summary of historical coal exploration

Report No	Licences	Companies - Authors	Report Title	Summary of Work
92_3394	EL3/1991	Merrywood Coal Company Pty Ltd (holder) - Morrison, K.C.	EL 3/91 - Mt Puzzler Annual Report and Partial Relinquishment Report Year 1 6/12/91 - 6/12/92.	Two coal outcrops identified, some outcrop mapping of Upper Parmeener
93_3407	EL12/1991	Merrywood Coal Company Pty Ltd (holder) - Morrison, K.C.	Year 1 and Final Report	6 shallow (up to 50m) drillholes at Pratts Hill on southern extents Merrywood opencut. Downgrade of extensions to Merrywood mine area
94_3571	EL19/1991	Merrywood Coal Company Pty Ltd (holder) - Morrison, K.C.	Merrywood Coal Company Pty Ltd; EL 19/91-Royal George Annual Report, Year 2 (10/4/93-10/4/94)	3 shallow core holes Royal George Series intersecting 1 seam each to >2m. Conjecture on whether the seam correlate between holes
94_3653	EL3/1991	Merrywood Coal Company Pty Ltd (holder); Morrison K C - Morrison, K.C.	Merrywood Coal Co, EL 3/91 Annual Report Year 3, 6.12.93-6.12.94. Mt Puzzler.	3 shallow core holes, Mt Puzzler Series, multiple seams to >3m, main seam correlated well between holes, recommendation of wash test and ply by ply analysis
95_3709	EL19/1991	Merrywood Coal Company Pty Ltd (holder); Morrison K C - Morrison, K.C.	Merrywood Coal Company Pty Ltd; EL 19/91-Royal George Annual Report, Year 3 (15/4/94-15/4/95)	Indicated (non JORC) resource calculation between Royal George Series of holes. Calculation of 400kT using a 9:1 maximum strip ratio

Report No	Licences	Companies - Authors	Report Title	Summary of Work
95_3806	RL12/1988	McElroy Bryan and Associates Pty Ltd; The Cornwall Coal Company NL (holder) - Bryan, J.H.	Part Relinquishment Report 1995, St Pauls River RL 8812	Four holes in relinquished area St Paul River DDH9,RGRDH1,RGRDH4, Lochaber RG RDH6, all hole less then 40m with the exception of St Paul River DDH9 which was 174m. Coaly intervals in rotary open hole, 1.175m seam in DDH9 at 137m plus other thin seams. Considered deep and uneconomic
95_3808	RL13/1988	McElroy Bryan and Associates Pty Ltd; The Cornwall Coal Company NL (holder) - Bryan, J.H.	Relinquishment Report 1995, St Pauls River RL 8813	One hole in relinquished area St Pauls DDH11 from 1984. One coal seam approx. 1.945m thick plus other thin seams.
98_4251	RL13/1988	McElroy Bryan and Associates Pty Ltd; The Cornwall Coal Company NL (holder) - Bryan, J.H.	Final Report - RL 8813, Royal George	3 core and 3 openhole drillhole logs and coal quality analysis, seam high in ash, low yield.
98_4252	RL12/1988	McElroy Bryan and Associates Pty Ltd; The Cornwall Coal Company NL (holder) - Bryan, J.H.	Final Report - RL 8812, Royal George	St Paul River DDH1 drillhole logs and coal quality analysis, 4 coal seams intersected up to 1.985m thick
09_5898	SEL32/2003	Focal Petroleum Engineering Pty Ltd; OME Resources Australia Pty Ltd (holder); Pure Energy Pty Ltd - Anon	Tasmanian Special Exploration Licence SEL 32/2003 Final Report Including Annual Report Volume 1 of 5	Duplicate drilling of DOM FT holes 41,55,59,82 for coal seam methane analysis, holes are outside licence.

## Regional Exploration Activities

### Remote Sensing

Multispectral ASTER satellite image data has been acquired, processed and incorporated into the GIS database for use in the integrated interpretation as a key element to drive Imperial's first year reconnaissance exploration program. Processed ASTER imagery can assist in mapping lithological and mineral composition variations over large areas of outcropping stratigraphy.

Key products and applications of the ASTER processing for coal exploration include:

- Clay occurrence and composition for detailed stratigraphic mapping
- Silica occurrence mapping, to assist quartzose stratigraphy interpretation.

The purpose of utilising ASTER data is to assist in discriminating lithological types within EL8/2012, and to further constrain the extent of the coal-bearing Upper Parmeener Supergroup.

The ASTER sensor has a scene area of 60 x 60km and collects information from the following channels (Figure 3, Table 2, Hewson, 2003):

- Three 15m pixel resolution visible-near-infrared (VNIR) channels (bands 1-3)
- Six 30m pixel resolution shortwave infrared (SWIR) channels (bands 4-9)
- Five 90m pixel resolution infrared (TIR) channels (bands 10-14)

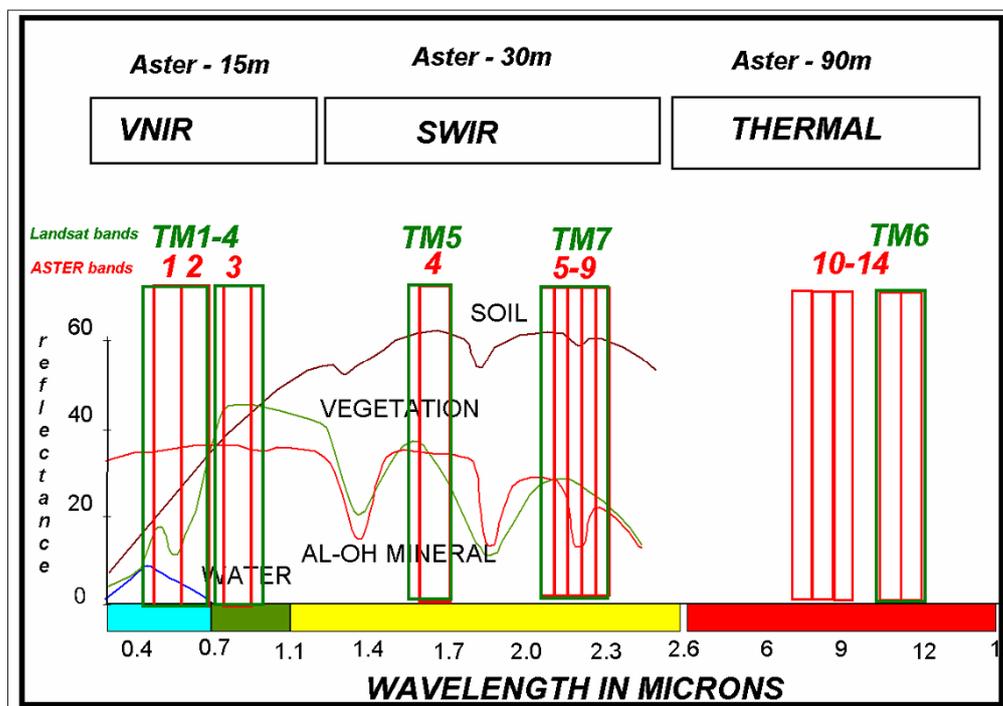


Figure 3 Remotely sensed ASTER versus Landsat TM bands, and overview of common spectral responses (Hewson, 2003)

The VNIR and SWIR modules are arranged as a 5000 element linear array and a 2048 element staggered array respectively, and both have push-broom detectors. The TIR employs a whiskbroom detector with a scan mirror for across track sampling. The VNIR and SWIR are available in 8 bit dynamic range

and TIR in 12 bit quantisation (Hewson, 2003). The SWIR bands are accurate to 3m between bands and 50m in overall accuracy. The ASTER sensor has a high signal to noise ratio of minimum 150:1, with most bands around 200:1 (Hewson, 2003).

Table 2 - Summary of ASTER sensor data (Hewson, 2003)

Spectral Range	VNIR $\mu\text{m}$	SWIR $\mu\text{m}$	TIR $\mu\text{m}$
FWHM [Centre $\lambda$ ]	Band 1 0.52 – 0.60 [0.556]	Band 4 1.600 – 1.700 [1.656]	Band 10 8.125 – 8.475 [8.291]
	Band 2 0.63 – 0.69 [0.661]	Band 5 2.145 – 2.185 [2.167]	Band 11 8.475 – 8.825 [8.634]
	Band 3N 0.78 – 0.86 [0.807]	Band 6 2.185 – 2.225 [2.209]	Band 12 8.925 – 9.275 [9.075]
	Band 3B 0.78 – 0.86 [0.804] Backward looking	Band 7 2.235 – 2.285 [2.262]	Band 13 10.25 – 10.95 [10.657]
		Band 8 2.295 – 2.395 [2.336]	Band 14 10.95 – 11.65 [11.318]
		Band 9 2.360 – 2.430 [2.400]	
Ground Resolution (m)	15	30	90
Dynamic Range	8	8	12

Raw ASTER imagery was processed to remove atmospheric, radiometric and geometric effects. A series of false colour images were then created from the data and colour balanced using combinations of the 3 VNIR (visible and near infrared) and 6 SWIR (short-wave infrared) ASTER bands.

These products were (Figure 5):

- Natural Colour stretch; the algorithm applied to the VNIR bands 321 in Red (band 2), Green ((3xband1+band3)/4), Blue ((3xband1-band3)/4), generates an image that simulates natural colour at 15m pixel size.
- 468 RGB stretch; this image uses ASTER's SWIR sensor, which has a 30m pixel size. These bands are highly sensitive to lithological and alteration variations and are in a region of the electromagnetic spectrum that the eye cannot perceive. The 468 RGB image is therefore the recommended image for geological/and mineralogical interpretation.
- 631 RGB stretch; this image uses a combination of bands 3 and 1 from ASTER's VNIR sensor and band 7 from the SWIR sensor. Band 7 is resized from a 30m pixel size to a 15m pixel to match the 15m pixel size of the VNIR bands. This combination of bands is sensitive to lithological variations and may be useful for geological/alteration interpretation. This image is similar to Landsat TM741 images.

The ASTER investigation comprised processing and mineral mapping as outlined in Figure 4. These mineral maps were generated by combining VNIR, SWIR, and TIR wavelengths in conjunction to specific mineral ratios. This can differentiate mineralogical occurrences in the area of interest. Key mineral ratio products that were processed using ENVI ASTER Mineral Ratio processing tool include:

- Ferric Iron (Band2/Band1) (Rowan and Mars, 2003)
- Ferrous Iron ((Band5/Band3)+(Band1/Band2)) (Rowan and Mars, 2003)
- Epidote/Chlorite/Amphibole (MgOH Bond) (Band6+Band9)/(Band7+Band8) (CSIRO)
- Sericite/Muscovite/Illite/ Smectite (AlOH Bond) ((Band5+Band7)/Band6)) (Rowan and Mars, 2003)

- Alunite/Kaolinite/Pyrophyllite ((Band4 + Band 6)/Band 5) (Rowan and Mars, 2003)
- Quartz rocks (Band14/Band12) (Rowan and Mars, 2003)
- Silica (Band11/Band12) (CSIRO)

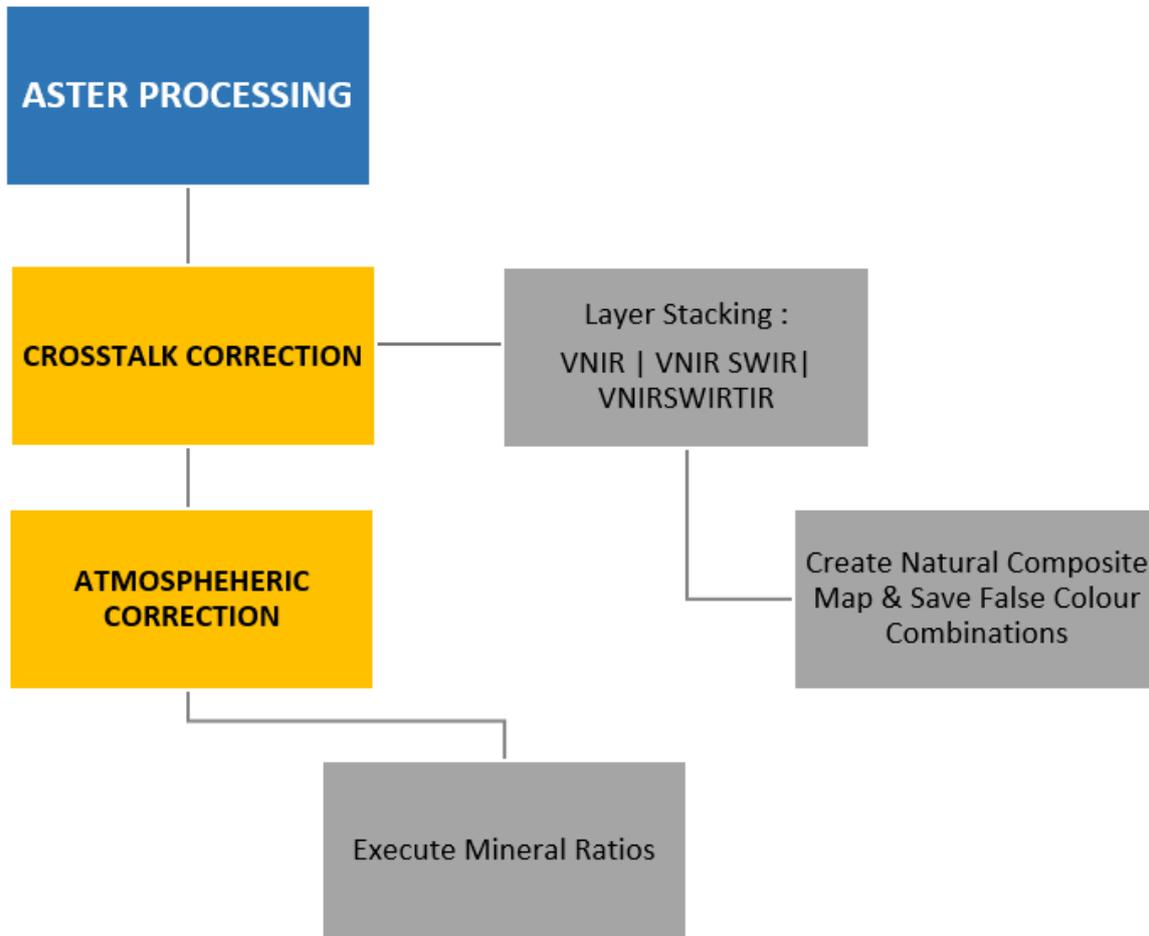


Figure 4 Aster Processing of Mineral Ratios

ASTER mineral ratio images were integrated with open file radiometrics and mapped outcrop geology to identify priority areas of potential outcropping Upper Permian Stratigraphy for field reconnaissance mapping. Due to significant vegetation coverage at the time of imagery acquisition the ASTER imagery was of limited use in mapping the mineralogical variation with the target sedimentary stratigraphy.

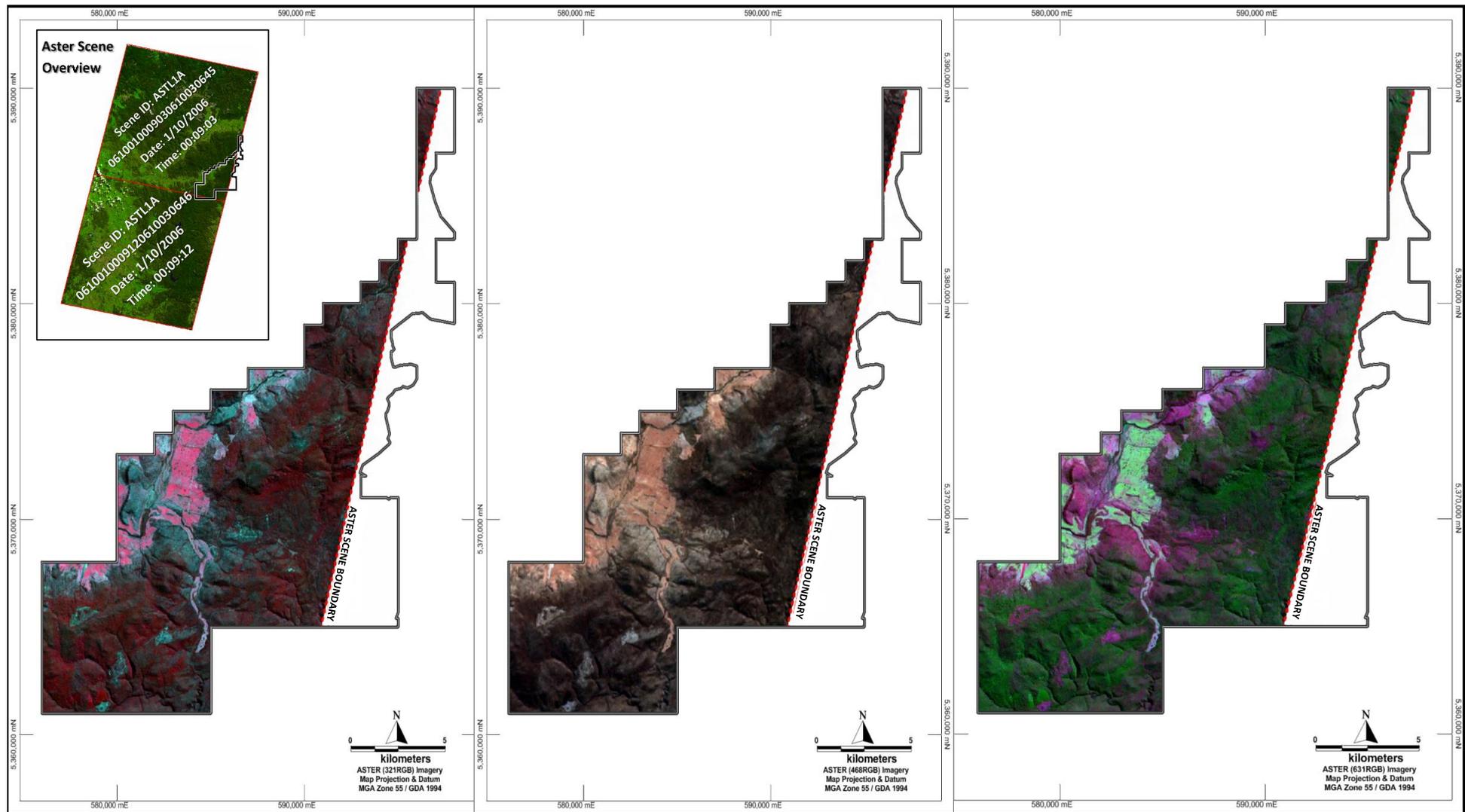


Figure 5 Examples of generated ASTER processing products. From left to right: 321RGB; 468RGB; 631RGB

## Prospect Based Exploration Activities

### Historic Drillhole Review

A review of key historical drillholes (Figure 6) at the Mineral Resources Tasmania (MRT) core shed was carried out by two geologists over three days in order to:

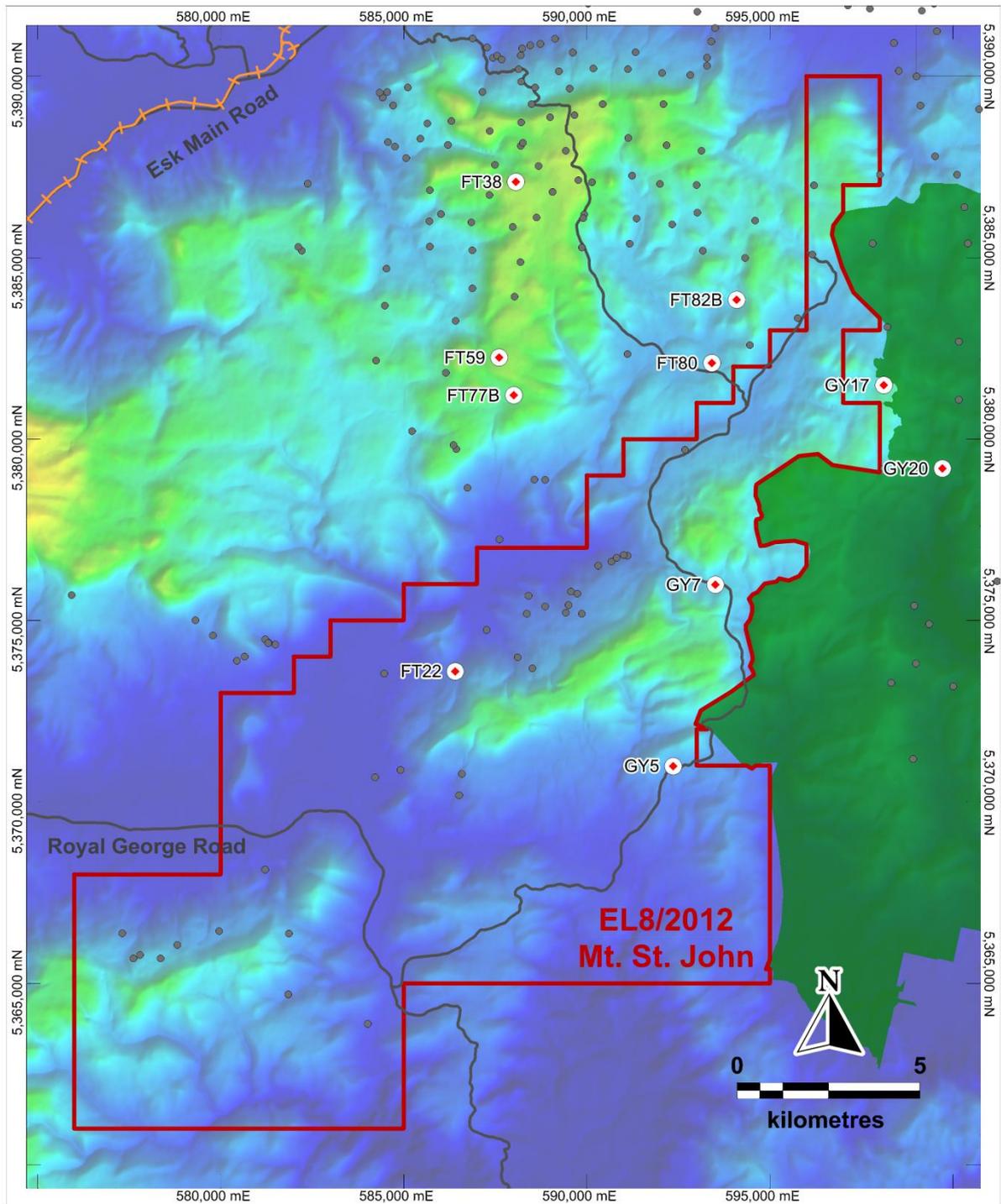
- Reconcile differences in logging terminology and confirm lithological contacts identification consistency between different drilling campaigns
- Confirm coal seam intervals are present and correctly logged, and whether any coal was not recorded
- Identify any new potential marker horizons

The drillholes reviewed were chosen from a variety of drilling campaigns, and were based on core shed availability and whether they contained substantial coal seams. Over 3000m of core drilling was reviewed during this period from key drillholes in or adjacent to the EL8/2012 (Table 3). Apart from relogging of the coal seam intervals, the following horizons and marker beds were checked against logging reported in each hole for:

- Base of dolerite
- Top of Dalmayne Conglomerate
- Top of quartzose sandstone
- Top of Permian sediments (top of Lower Parmeener Supergroup)
- Quartz veins/bands
- Tuff beds

Table 3 – Sections of key drillholes reviewed during the core shed visit.

DH Tiger ID	Drillhole Name	From (m)	To (m)	Total (m)
3561	Fingal Tier 38 (FT38)	335.2	558.6	223.4
3607	Fingal Tier 82 (FT82)	54.4	428.1	373.7
6310	GY11 Gray (GY11)	120.9	473.0	352.1
12006	GY20 Gray (GY20)	384.0	471.5	87.5
12981	GY17 Gray (GY17)	249.9	604.0	354.1
3605	Fingal Tier 80 (FT80)	231.5	438.7	207.2
3583	Fingal Tier 59 (FT59)	227.1	572.7	345.6
3602	Fingal Tier 77B (FT77B)	155.0	445.0	290.0
6308	GY7 Gray (GY7)	141.8	418.9	277.1
6307	GY5 Gray (GY5)	96.2	455.0	358.8
3544	Lochaber 22 (FT22)	0.0	228.6	228.6



- EL8/2012
- National Park
- Railway
- Major Road
- Historic drillhole
- Historic drillhole (Reviewed in core shed)

Projection and Datum: MGA zone 55 (GDA94)  
 Transverse Mercator  
 Grid generated from Shuttle Radar Topography  
 Mission (SRTM) elevation data



Figure 6 – Location of historic drillholes

## Field Mapping

The intention of the field program was to:

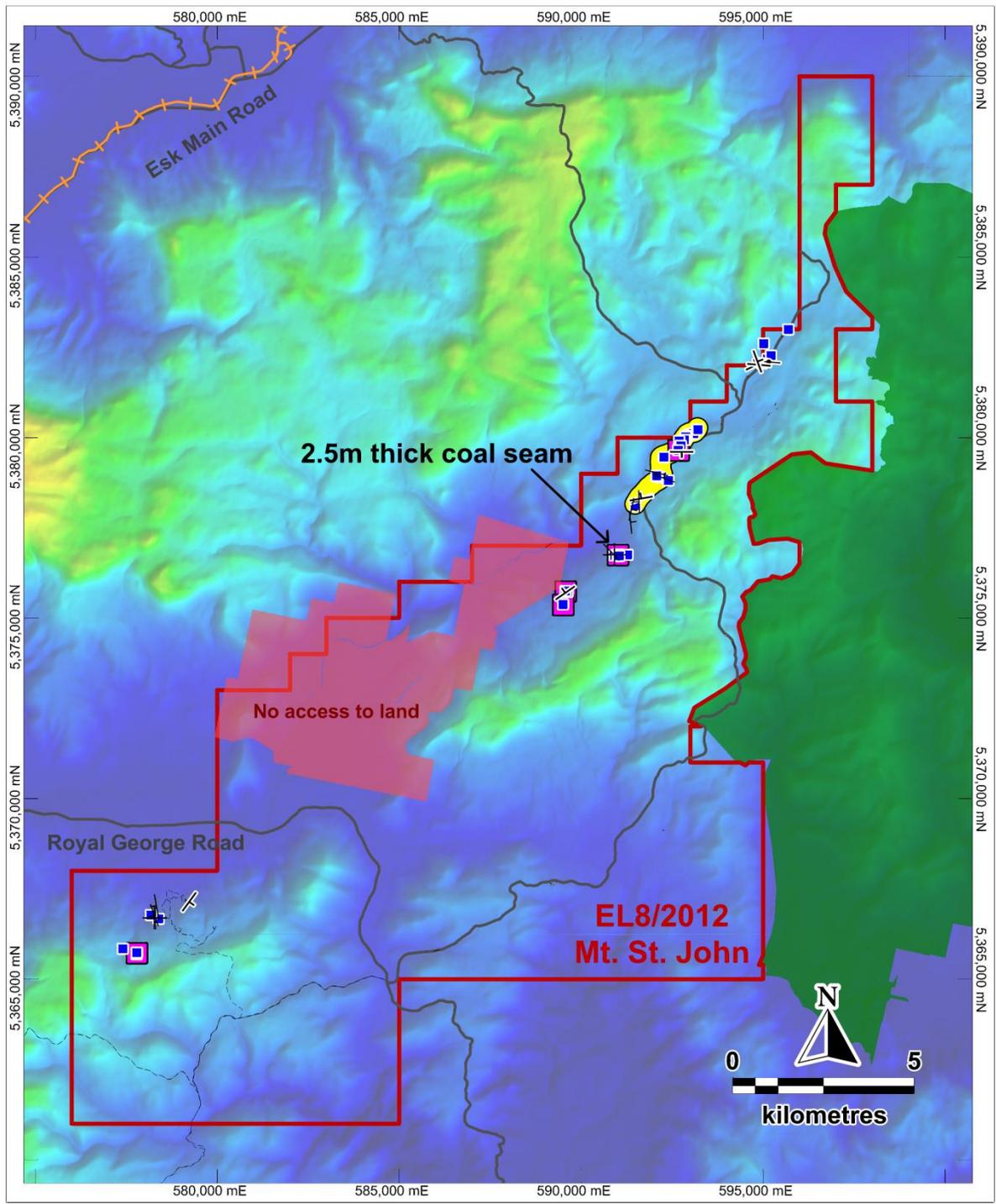
- Locate historical drillholes and determine accuracy of collar position using a GPS
- Locate mapped and new coal outcrops
- Collect structural measurements to assist cross-section generation
- Follow-up areas of ASTER mineral anomalies that indicated potential outcropping Upper Parmeener Supergroup

The outcomes and highlights of the field investigation were:

- 8 geologist-day reconnaissance covering over 80km of 4WD tracks and hiked traverses (Figure 8)
- Attempted to locate 7 drillholes and one historical coal working (Table 4) based on MRT database locations, one of which (FT80) could be visually confirmed as being in the correct position (Appendix 1)
- Located 5 coal occurrences, including one previously unknown seam greater than 2.5m thick (Figure 7 and Figure 8)
- Mapping of over 34 sediment outcrops and collection of 17 strike and dip measurements
- Mapping of the top of the Dalmayne Conglomerate marker bed over a strike length of approximately 4km (Figure 8 and Figure 9)
- Ground truthing of ASTER mineral anomalies suggests that remote sensing techniques are appropriate for targeting outcropping Parmeener Supergroup sediments, although due to strong vegetation interference it has limited use in specifically discerning the type of sediment present.



*Figure 7 - Coal seam (2.5m thick) discovered in creek during field investigation*



EL8/2012	Mapping data point	Projection and Datum: MGA zone 55 (GDA94) Transverse Mercator Grid generated from Shuttle Radar Topography Mission (SRTM) elevation data
National Park	Mapped coal	
No land access	Structural measurement	<p>Created for:</p> <p>Developed by:</p>
Railway		
Major Road		
Driven/hiked track		
Mapped extent of Dalmyne Conglomerate		

Figure 8 - Overview of data collected during field program

Table 4 - Drillhole collars and historical workings searched for during field investigation

DH Code <sup>2</sup>	MRT <sup>1</sup> location		Field Location		MRT <sup>1</sup> location error (m)	Comment	Photo ID
	Easting	Northing	Easting	Northing			
<b>GY7</b>	593,513	5,375,983	N/A		50	No evidence of drill site at GPS location	FGL-021
<b>GY5</b>	592,362	5,370,984	N/A		50	No evidence of drill site at GPS location	FGL-020
<b>GY9 (&lt;3km from EL8/2012)</b>	595,763	5,383,334	595,858	5,383,274	50	No evidence of drill site at department location. Found truck tyre and evidence of bulldozing 100m S-SE of department location of GY9	FGL-022 (tyre location)
<b>SPR2 (&lt;3km from EL8/2012)</b>	591,113	5,382,340	590,993	5,382,420	5	No collar found, clearing suggests location of drillpad	N/A
<b>MP1</b>	590,817	5,376,728	N/A		0.5	No evidence of drill site at GPS location	20130912_172940
<b>FT80 (&lt;3km from EL8/2012)</b>	593,413	5,382,091	593,415	5,382,100	5	Definite location of drillhole, dolerite core rods and polypipe present	FGL_019
<b>FT84 (&lt;3km from EL8/2012)</b>	594,456	5,382,586	N/A		5	No evidence of collar found	N/A
<b>Lewis Hill Historical Working</b>	577,312	5,366,382	N/A		N/A	No evidence of working observed at GPS location	N/A

<sup>1</sup> – Mineral Resources Tasmania

<sup>2</sup> – For DH abbreviations see Table 5



*Figure 9 - Dalmayne conglomerate in road cutting (top) and subcropping (bottom)*

## Drillhole Database Compilation

Historic drillhole data was recovered from scanned historical exploration reports to produce a digital GIS drillhole database from which geological cross sections could be generated. Historic drillhole locations were recovered from the published state wide drillhole dataset, and downhole data was compiled from historical company exploration reports, both of which were downloaded from Mineral Resources Tasmania ([www.mrt.tas.gov.au](http://www.mrt.tas.gov.au)). The drillhole data recovered from reports consisted of:

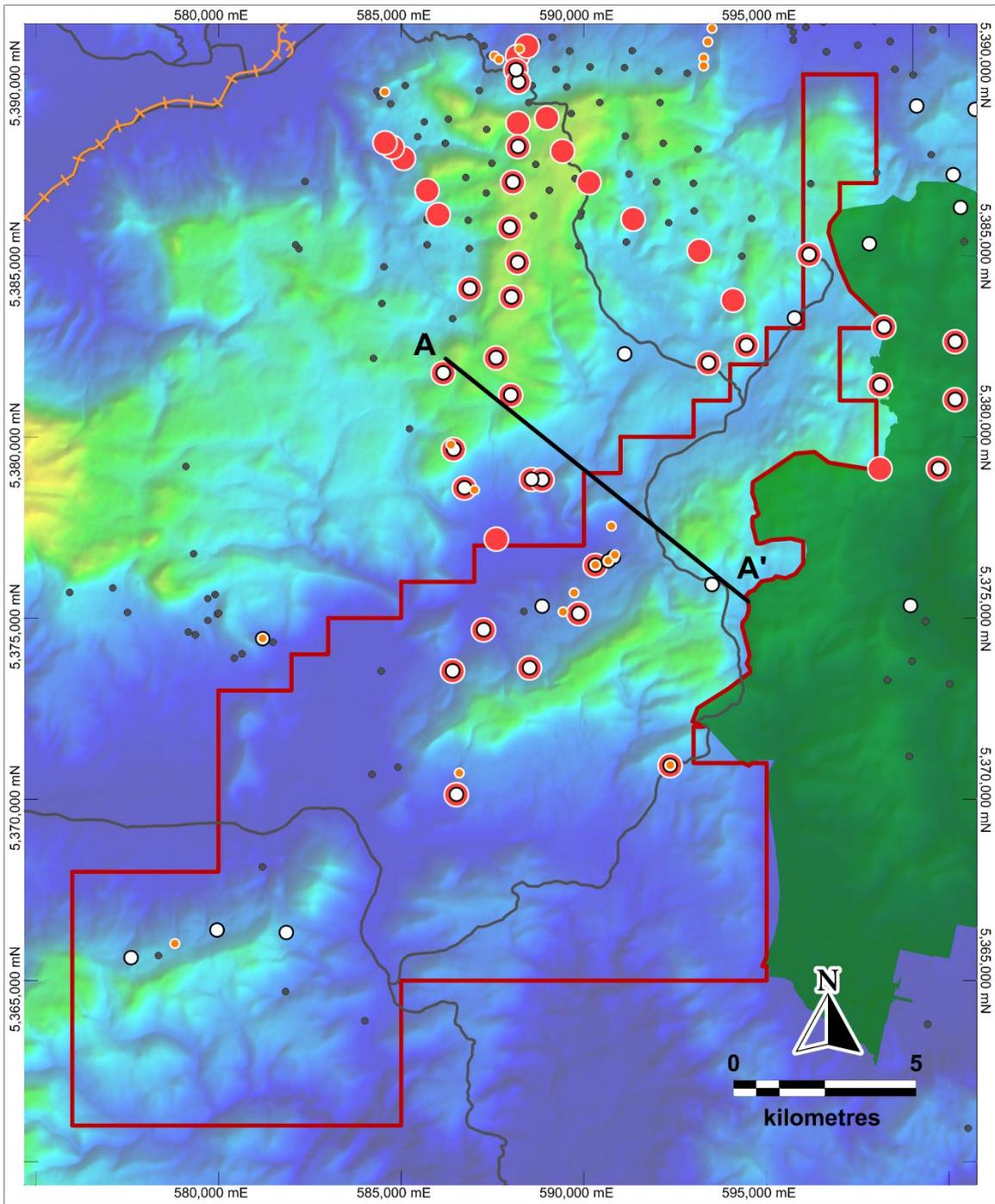
- Survey details
  - Total drillhole length
  - Collar location
- Depth to base of dolerite
- Depth of Dalmaine Conglomerate and tuff marker beds
- Coal seam depths, thicknesses and descriptions
- Coal quality results
- And if identified historical coal outcrop locations were compiled

Drillholes were selected primarily for their proximity to EL8/2012, but availability and quality of data were also taken into account. Detailed downhole lithology logs were compiled for 48 drillholes, and coal seam data has been extracted for 47 drillholes, and the Dalmaine Conglomerate was recorded in 29 drillholes. Drillholes that have detailed downhole lithology logs and/or seam data are listed in Table 5 and shown in Figure 10.

Table 5 – Summary of Drillholes for which detailed and/or seam data was recovered

Imperial CollarID	MRT Name	MRT Drill ID	Length	Easting	Northing	Accuracy	RL (25kTopo)
C3F	C3 Fingal	13064	162.69	588193	5390564	5m	453
C6F	C6 Fingal	13067	104.24	588453	5390844	50m	400
DDH16S tPR	DDH16 Old Meadstone St Pauls	18755	32.13	587263	5374734	5m	291
FT01	FT-DOM1 Fingal Tier	3522	217.93	584566	5388174	5m	531
FT04	FT-DOM4 Fingal Tier	3525	330.12	588145	5390183	5m	552
FT17	FT-DOM17 Fingal Tier	3539	505.29	588198	5388069	5m	780
FT20	FT-DOM20 Fingal Tier	3542	465.54	588997	5388861	5m	810
FT22	Lochaber 22	3544	228.56	586407	5373598	5m	406
FT24	FT-DOM24 Fingal Tier	3546	523.26	589426	5387944	5m	841
FT25	FT-DOM25 Fingal Tier	3547	525.93	588207	5388719	5m	788
FT26	FT-DOM26 Fingal Tier	3548	459.22	585715	5386857	5m	738
FT30	FT-DOM30 Fingal Tier	3552	254.85	585066	5387744	5m	522
FT32	FT-DOM32 Fingal Tier	3554	274.67	584762	5388051	5m	536
FT37	Fingal Tier 37	3560	311.72	588210	5389846	5m	600
FT38	Fingal Tier 38	3561	558.59	588063	5387087	5m	813
FT43	Fingal Tier 43	3566	506.03	587977	5385841	5m	788
FT44	Fingal Tier 44	3567	407.23	586020	5386194	.5m	671
FT46B	Fingal Tier 46B	3570	547.21	590142	5387077	5m	778
FT53	Fingal Tier 53	3577	467.85	588189	5384868	5m	800
FT57	Fingal Tier 57	3581	573.8	588026	5383918	5m	806
FT58	Fingal Tier 58	3582	399	586876	5384152	5m	641
FT59	Fingal Tier 59	3583	572.68	587607	5382242	5m	802
FT60	FT-60 Fingal Tier	3584	474	586151	5381820	5m	730
FT70	Fingal Tier 70	3595	416.27	591356	5386069	5m	610
FT76	Fingal Tier 76	3601	549.83	586440	5379716	5m	743
FT77B	Fingal Tier 77B	3602	445	588004	5381208	5m	737
FT80	Fingal Tier 80	3605	438.7	593413	5382091	5m	590
FT81	Fingal Tier 81	3606	438.62	593166	5385190	5m	655
FT82	Fingal Tier 82	3607	428.13	594091	5383834	5m	594
FT84	Fingal Tier 84	3609	253.89	594456	5382586	5m	642
GY1	GY1 Gray	12967	335	602113	5382984	50m	446
GY10	GY10 Gray	12974	501	600313	5386384	50m	554
GY103	GY103 Gray	18146	238.12	598940	5375403	5m	286
GY11	GY11 Gray	6310	473	596163	5385084	50m	600
GY12	GY12 Gray	12976	515	600113	5387284	50m	567

Imperial CollarID	MRT Name	MRT Drill ID	Length	Easting	Northing	Accuracy	RL (25kTopo)
GY14	GY14 Gray	12978	410	597813	5385384	50m	543
GY16	GY16 Gray	12980	320	600713	5389084	50m	535
GY17	GY17 Gray	12981	604	598113	5381484	50m	678
GY18	GY18 Gray	12982	271	599113	5389184	500m	498
GY19	GY19 Gray	12005	478.4	598113	5379184	500m	628
GY2	GY2 Gray	12968	511	600163	5382684	50m	478
GY20	GY20 Gray	12006	471.5	599713	5379184	500m	514
GY3	GY3 Gray	12969	487	600163	5381084	50m	501
GY4	GY4 Gray	12970	452	598213	5383084	50m	545
GY5	GY5 Gray	6307	455	592363	5370984	50m	474
GY6	GY6 Gray	12971	151.7	602113	5381084	50m	442
GY7	GY7 Gray	6308	418.92	593513	5375984	50m	590
GY8	GY8 Gray	12973	266	601713	5360484	50m	226
GY9	GY9 Gray	6309	426.2	595763	5383334	50m	542
MP1	MT PUZZLER MP-1	16572	26	590817	5376728	.5m	360
MP2	MT PUZZLER MP-2	16573	45	590674	5376628	.5m	374
MP3	MT PUZZLER MP-3	16574	33	590316	5376510	.5m	360
RGRDH2	ROYLE GEORGE RG RDH2	16546	37	588863	5375384	5m	394
RGRDH5	RG RDH5 Lochaber	18753	28	587613	5377234	50m	283
SP17	Stp-17 St.Pauls	19582	102.1	588573	5378884	50m	442
SPR01	STPR-1 St. Pauls River Mt. Puzzler	19583	249.9	586738	5378652	500m	478
SPR02	St Pauls River 2	9496	259	591113	5382340	5m	540
SPR03	St Pauls River 3	0	279.15	589863	5375184		469
SPR08A	DDH8A ST PAUL'S RIVER	10039	149	581863	5366374	50m	534
SPR09	SPR-09 St Pauls River	18752	174.3	586513	5370184	500m	330
SPR10	St Pauls River 10	0	156.2	588863	5378874		440
SPR11	St Pauls River 11	0	156.4	588513	5373684		500
SPR12	DDH12 ST PAUL'S RIVER	10040	180	577613	5365684	50m	559
SPR15	DDH15 ST PAUL'S RIVER	10083	129	579963	5366444	50m	502



- |   |   |   |   |
|---|---|---|---|
|  | <b>EL8/2012</b>                             |  | <b>Historic drillhole<br/>(detailed data<br/>recovered)</b> |
|  | <b>National Park</b>                        |  | <b>Historic DH<br/>(Seam data<br/>recovered)</b>            |
|  | <b>Railway</b>                              |  | <b>Historic DH<br/>(no/ limited data<br/>recovered)</b>     |
|  | <b>Major Road</b>                           |   |   |
|  | <b>Cross-section<br/>location</b>           |   |   |
|  | <b>Historical coal<br/>outcrop location</b> |   |   |

Projection and Datum: MGA zone 55 (GDA94)  
 Transverse Mercator  
 Grid generated from Shuttle Radar Topography  
 Mission (SRTM) elevation data



Figure 10 - Showing historic drillholes for which data was compiled as section line generated

## Sectional Interpretation

A 2D cross section was generated across the northern half of EL8/2012 (Figure 12) to understand the potential of the multiple seams intersected in historic drilling to occur at depths potentially amenable to open-cut exploitation in the St Pauls Valley.

Stratigraphic correlation of seams adjacent to EL8/2012 have also been carried out previously by Bacon (1991; Figure 11). Ten seams are interpreted along section using the extracted seam database created by Imperial. The cross section suggests that although separate drilling campaigns have used different seam nomenclature, the seams are mostly able to be correlated using the work from Bacon, 1991 along general 1-2 degree south-southwest dip. The upper seams are shallow and are projected to surface in topographic lows. The valley is more incised southward, and therefore potential exists for the lower seams to occur at shallower depths to the south.

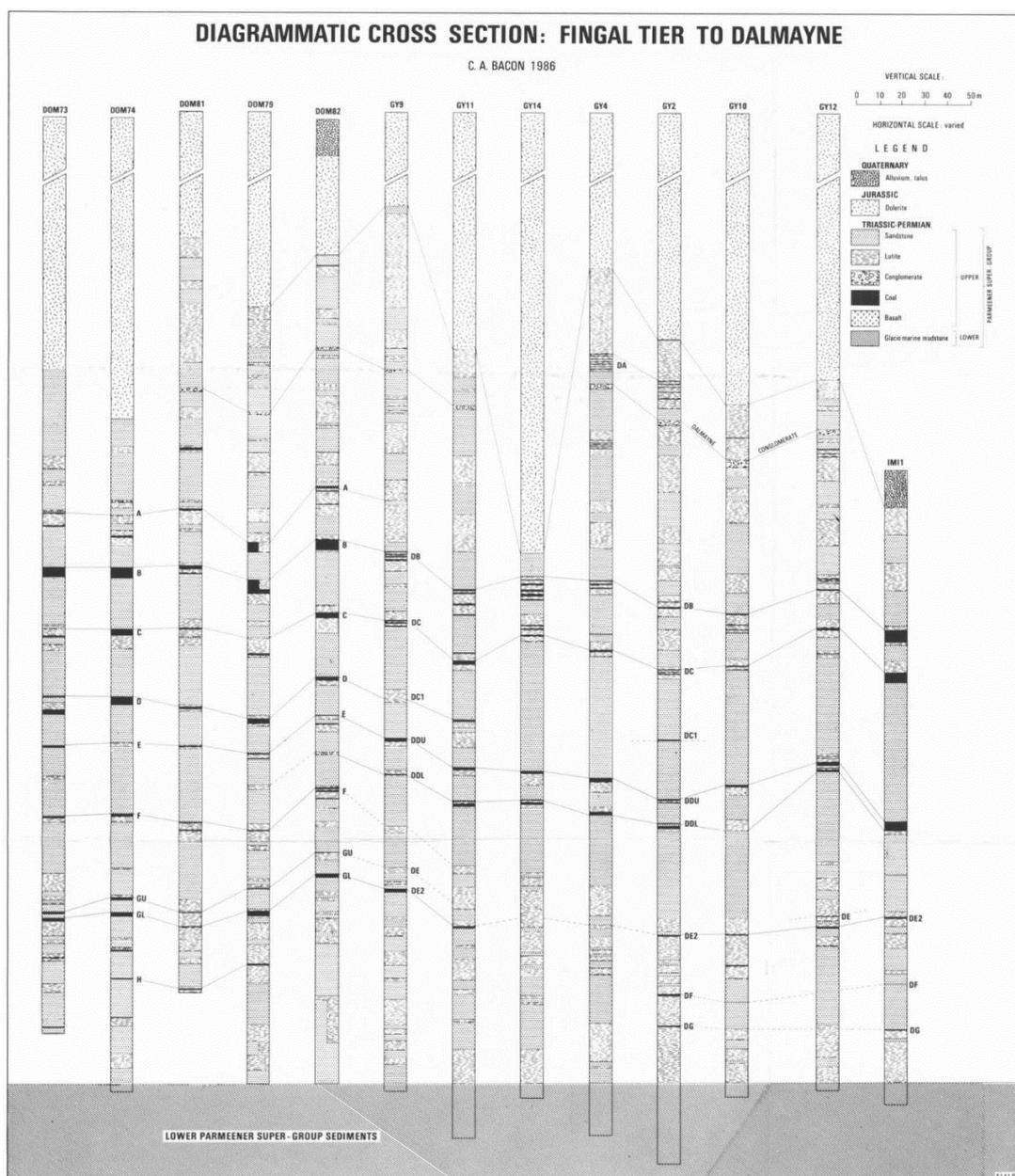


Figure 11 – Stratigraphic correlation between Fingal Tier (FT series) and Dalmayne (GY series) drilling programs. From Bacon (1991)

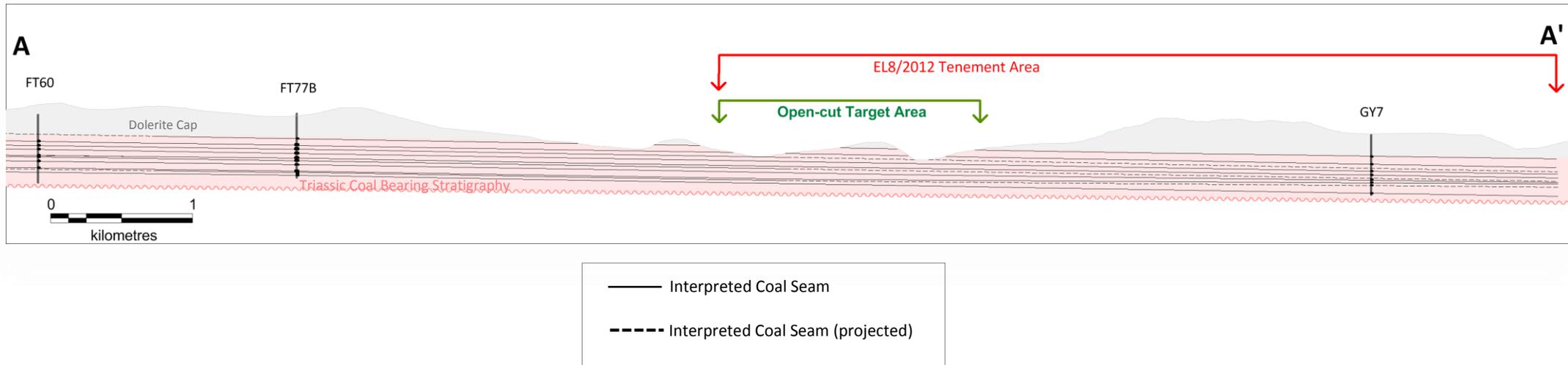


Figure 12 Schematic cross-section across EL8/2012. Section line location is shown in Figure 10

## 4. Discussion of results

Imperial's first year exploration involving remote sensing, historic drillhole review, field mapping, and sectional interpretation has increased the geological understanding of coal occurrences in EL8/2012. Key aspects of this work include

- ASTER processing and field follow-up program
- Mapping of the Dalmayne conglomerate (a key marker horizon)
- Identification and mapping new coal outcrops
- New understanding of the potential for shallow coal (potentially open pittable) through sectional interpretation

ASTER imagery due to significant vegetation coverage at the time of imagery acquisition was of limited use in remote mapping of the stratigraphy but was useful in determining the potential windows of outcropping sediments in large heavily vegetated expanses.

The ASTER imagery guided Imperial to areas where outcrop to subcrop of the Parmeener Group could be mapped. Global Ores field team was able to map a 4km strike length of the Dalmayne Conglomerate a key marker horizon identified by Shell in its resource drilling of the Dalmayne Area (Sansom, 1980). The consistency of sediment thickness between the Dalmayne Conglomerate and the first seam below will help in utilising this mapping in future 3D modelling of the coal seam and faulting in the area. Given this success, further mapping is required in the second year of the licence to increase the mapped distribution of this horizon, and this will assist in 3D modelling of the coal seams.

Mapping by Imperial located 5 new coal outcrops including one seam of >2.5m thickness in EL8/2012 (Figure 8). Preliminary analysis of the relationship between this particular seam outcrop and historic drilling indicates that this may potentially be the Dalmayne A seam which was intercepted in FT77B (Seam B) just outside of the licence at ~248m depth.

New outcrops of coal seams provide additional 3D control on the distribution of coal seams at relatively low cost when compared to drilling. Given that new outcrops were identified through reconnaissance mapping over an initial relatively small area, further systematic mapping over a wider area in Year 2 of this licence is warranted.

The first pass sectional interpretation of the historic drilling integrated with new field geological and structural mapping suggests that many of the seams are potentially shallowly covered in the St Pauls River Valley floor. Initial analysis indicates that small to medium size resources maybe identified by further work. It should be noted that Imperial was unable to undertake any field reconnaissance in the key area of interest with known coal outcrops due to landholder access issues.

## 5. Conclusions

EL8/2012 is prospective for export thermal coal resources within the Upper Permian of the Tasmania Basin. Little to no exploration has been conducted for coal in the area since the 1990's with the bulk of exploration being shallow drilling in the 1980's. Imperial is exploring EL8/2012 for shallow modest size open-cut and larger export thermal coal resources. Imperial's Year 1 exploration program on EL8/2012 consisted of:

Desktop Work including:

- Remote sensing - Acquisition and processing of ASTER imagery
- Literature review
- Land access
- Cross section interpretation

Field Work including:

- Land owner meetings
- Historical drillcore review
- Mapping of new marker horizons and new coal outcrops
- Locating drillholes and historic outcrops

Key findings were:

- ASTER mineral mapping did not allow for desktop stratigraphic mapping due to dense vegetation cover, it did however help guide field mapping programs through identification of area more likely to have outcrop.
- Historic Resources adjacent to EL8/2012 are potentially of export quality coal after washing. These resources trend into EL8/2012.
- The Dalmyne Conglomerate marker horizon identified in drilling was mapped in the field and may provide important information with the 3D distribution of coal.
- New coal seam outcrops were identified that will add significantly to modelling of coal throughout the licence. Preliminary sectional interpretation indicates that there is potential for shallow coal resources to be identified in the St Paul River Valley.

Recommendations:

Year 2 works will focus on further mapping of the Dalmyne Conglomerate Marker horizon and on exploring for new coal outcrops. Both of these pieces of information will add significantly to the 3D understanding of the distribution of coal within the licence.

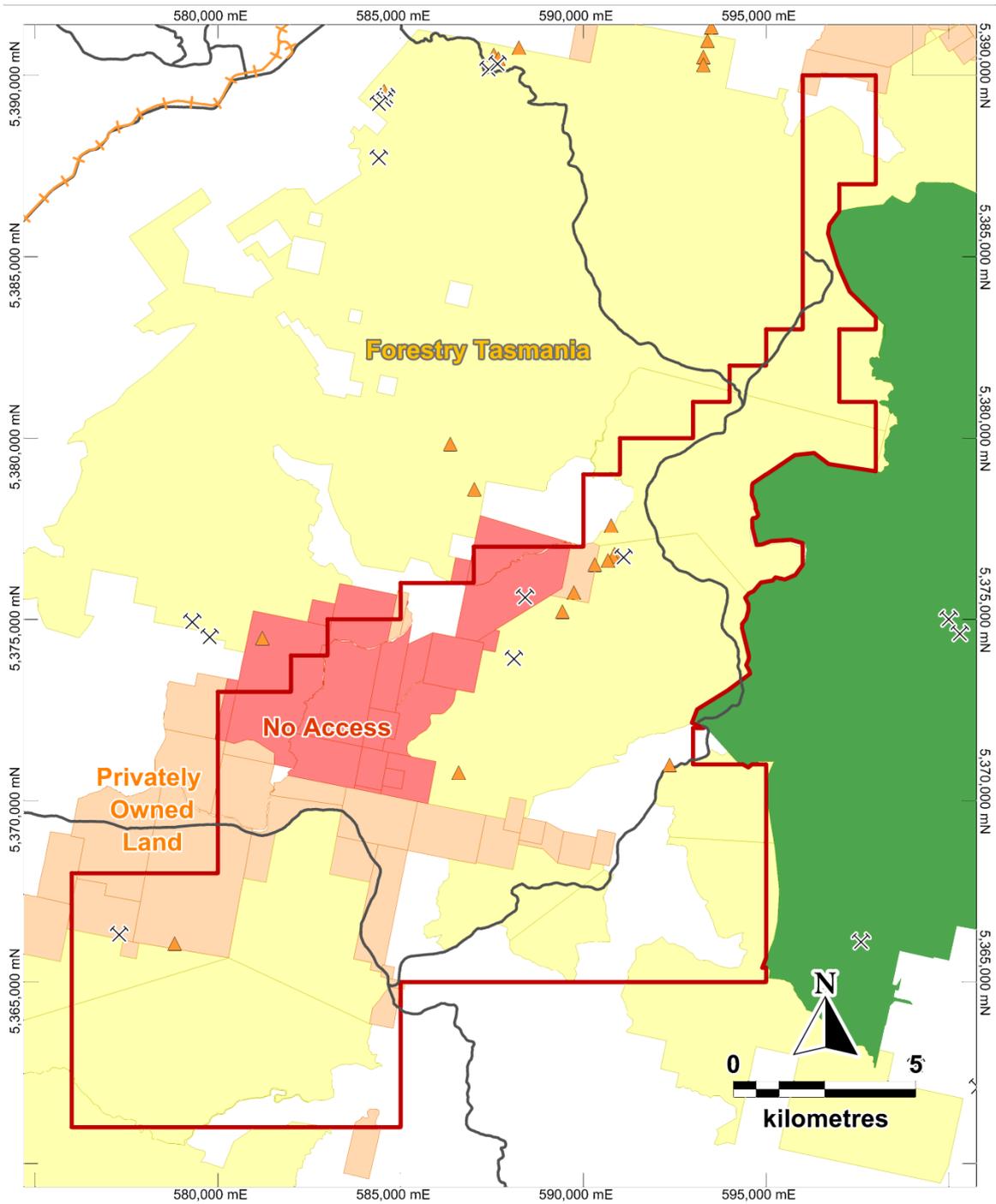
Given that seams are generally < 2m thick, small topographic inaccuracies may limit the evaluation of the economic viability of any coal, particularly strip ratio. Therefore Imperial should consider the acquisition of a LIDAR DEM.

A preliminary 3D model using digitally recovered historic seam and detailed lithological data should be built prior to any further drilling. This will assist in choosing locations for drillholes planned in year 2 to maximise the definition of any potential open-pit resource and test areas of high geological uncertainty.

## 6. Environment

Prior to conducting field work in EL8/2012 Imperial submitted a work program to the environmental division of MRT. This program outlined the low impact nature of the investigation, which involved driving on established tracks and roads, hiking to points of interest, and collecting small rock samples. The work program was communicated to Imperial to be accepted on August 9<sup>th</sup> 2013. No environmental concerns were raised, except to be aware of possible eagles nesting.

In accordance with Tasmanian legislation, Imperial sent out letters to advise landholders within EL8/2012 at least 14 days in advance of entry. These letters, sent to both private landowners and Forestry Tasmania (Figure 13), outlined the nature of the exploration activities and provided contact details should the landowners have any queries.



- EL8/2012
- National Park
- Privately Owned Land
- No Access Granted to Private Property
- Forestry Tasmania Land
- Railway
- Major Road
- ▲ Historical coal outcrop location
- X Historical Coal Working

Projection and Datum: MGA zone 55 (GDA94)  
Transverse Mercator

Created for:

**IMPERIAL COAL**

Developed by:

**GLOBAL ORE DISCOVERY**

Figure 13 – Location of private- and government-owned (Forestry Tasmania) land parcels within EL8/2012

## Expenditure

Table 6 Expenditure statement for EL28/2012

	Annual Expenditure
1A. Geology	\$ 28,094.60
1B. Geochemistry	\$ -
1C. Geophysics	\$ -
1D. Remote Sensing	\$ 781.50
2A. Gridding	\$ -
2B. Drilling	\$ 137.50
3. Land Access Costs	\$ 6,359.19
4. Rehabilitation	\$ -
5. Feasibility Study	\$ 4,999.94
6. Other (fees, surveys etc)	\$ -
7. Administration Costs	\$ 2,165.65
TOTAL	\$ 42,400.88

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## Keywords

Coal Black

Coal General

Fingal Coal Field

Dalmayne

Mt St John

Upper Parmeener

Lower Parmeener

Tasmanian Basin

ASTER

EL8/2012

## Appendix 1 – Location of historical drillhole photos



*PHOTO: 20130912\_172940. Mount Puzler DH 1 GPS location*



*PHOTO: FGL-020 Department GPS location of drillhole GY5*



*PHOTO: FGL-022. Possible proximal location to drillhole GY9*



*PHOTO: FGL-019. Definite drillhole location of FT80 (agrees with department location)*