Report on preliminary resource calculations and suggested work program for Area 5, China Bush Plantation site

Mike Blake, October 2009

Executive Summary

This review of shallow resources at China Bush provides an estimate of approximately 1 million tonnes of inferred inventory shale at depths less than 20m. Interpretations indicate that there is potential to increase the known shallow resource by up to 2.6 million tonnes, through drilling exploration in the immediate area, giving a total potential inventory resource of up to 3.6 million tonnes of oil shale. A work program costed at $100,000 provides for increasing the confidence level of the current Boss Energy resource, testing potential resource expansion areas, and an environmental baseline monitoring program.

Introduction

Recently a review has begun of shallow resources across the Latrobe tenement. The intent is to bring Boss Energy's understanding of shale assets up to date, identify any areas of shale potential previously overlooked, and recommend ongoing work programs.

The calculations shown below were made from combining previous work with recent drilling information obtained by Boss Energy. Approximately one half of the areas outlined are supported by drilling data to a good degree of confidence. Reasonable interpretations have been made based on drilling data, site conditions and geological information. Areas are outlined in the attached figures 1-4.

Boss Energy calculations

The figures referred to below refer only to the area defined by and immediately adjacent to drilling conducted by Boss Energy in April 2007 (Fig1) , constituting a proportion of the previously quoted CRAE resource, and include an extracted 1000T bulk sample. For the less than 20m depth category, a single drillhole recording 21m shale depth has been included in calculations. The current figures were calculated using the guidelines of The Australian Standard for Coal Resource Assessment (2003) that has been accepted by NSW and QLD. Under the code, the figures quoted here satisfy the terms of the indicated inventory coal category. It is important to note that this is **not a JORC compliant resource** for public reporting purposes**,** and should not be quoted as such.

Table 1.

BOE calculations

Variables		
Horizon thickness	1	metre
Horizon Density	2.62	Tonnes per cubic metre
Yield	146	Litres/Tonne
Barrel volume	159	Litres
Barrel price	$80	Australian Dollars

BOE Resource

Area	Location	Category	Area Km^2	Shale Tonnes	Barrels	In Ground Value
V	China Bush	<20m depth	0.3688	968,000	889,000	**$71,116,000**
V	China Bush	<5m depth	0.08469	222,000	204,000	**$16,331,000**

Previous resource estimate

Previous resource estimates for this area of **2.2 MT open cuttable** (<20mdepth) shale were presented by CRA Exploration LTD in 1992, shown in Fig2.
The corresponding area is referred to as North China Flat and figures were presented as ‘order of magnitude’ geologically indicated resource potential. Within the framework of The Australian Standard for Coal Resource Assessment mentioned above, this calculation would fall into the category of inferred inventory coal.

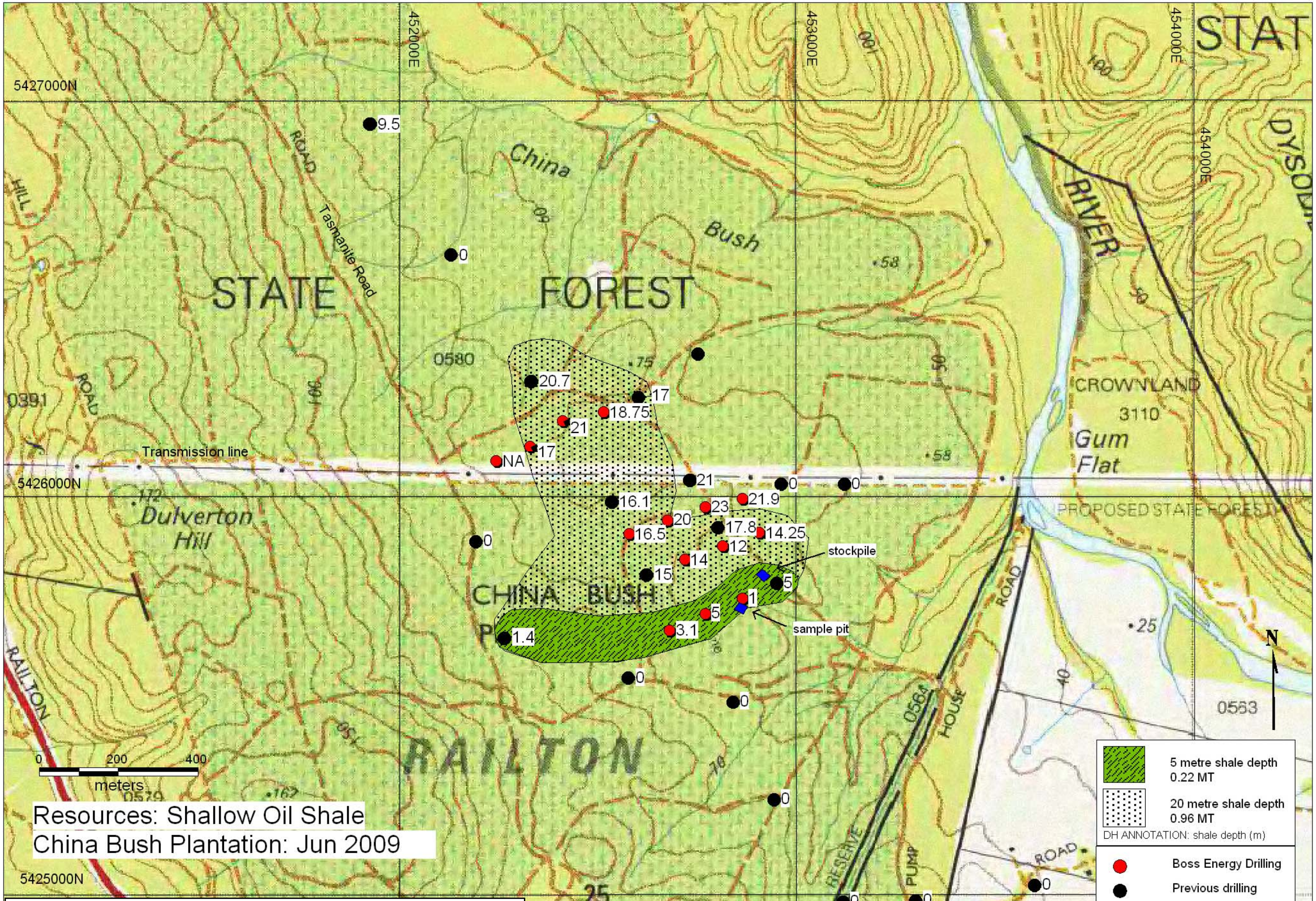

Fig 1. Boss Energy Resource. Drill hole annotation shows depth to shale

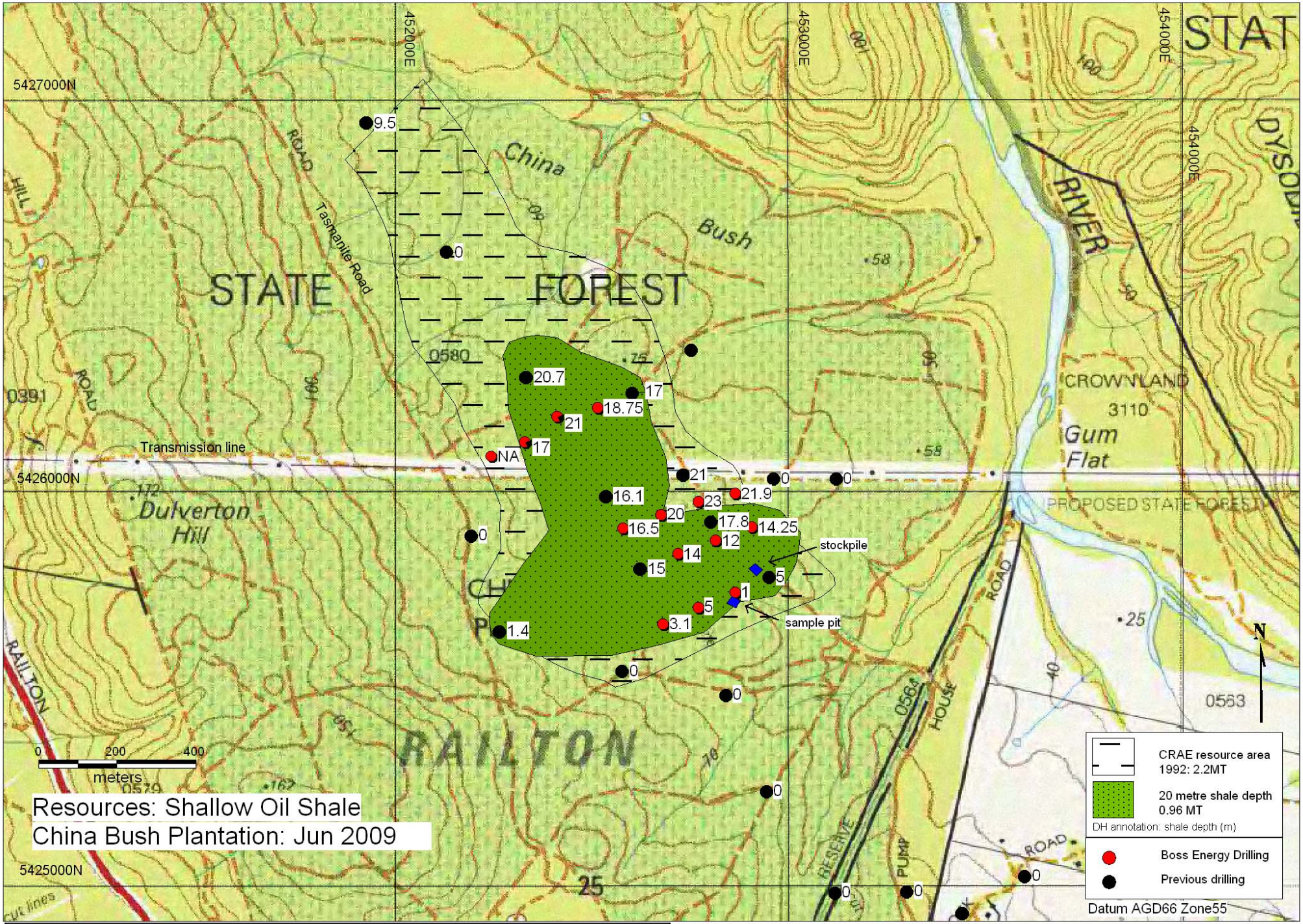

Fig 2. CRAE/Boss Energy resources. Drill hole annotation shows depth to shale

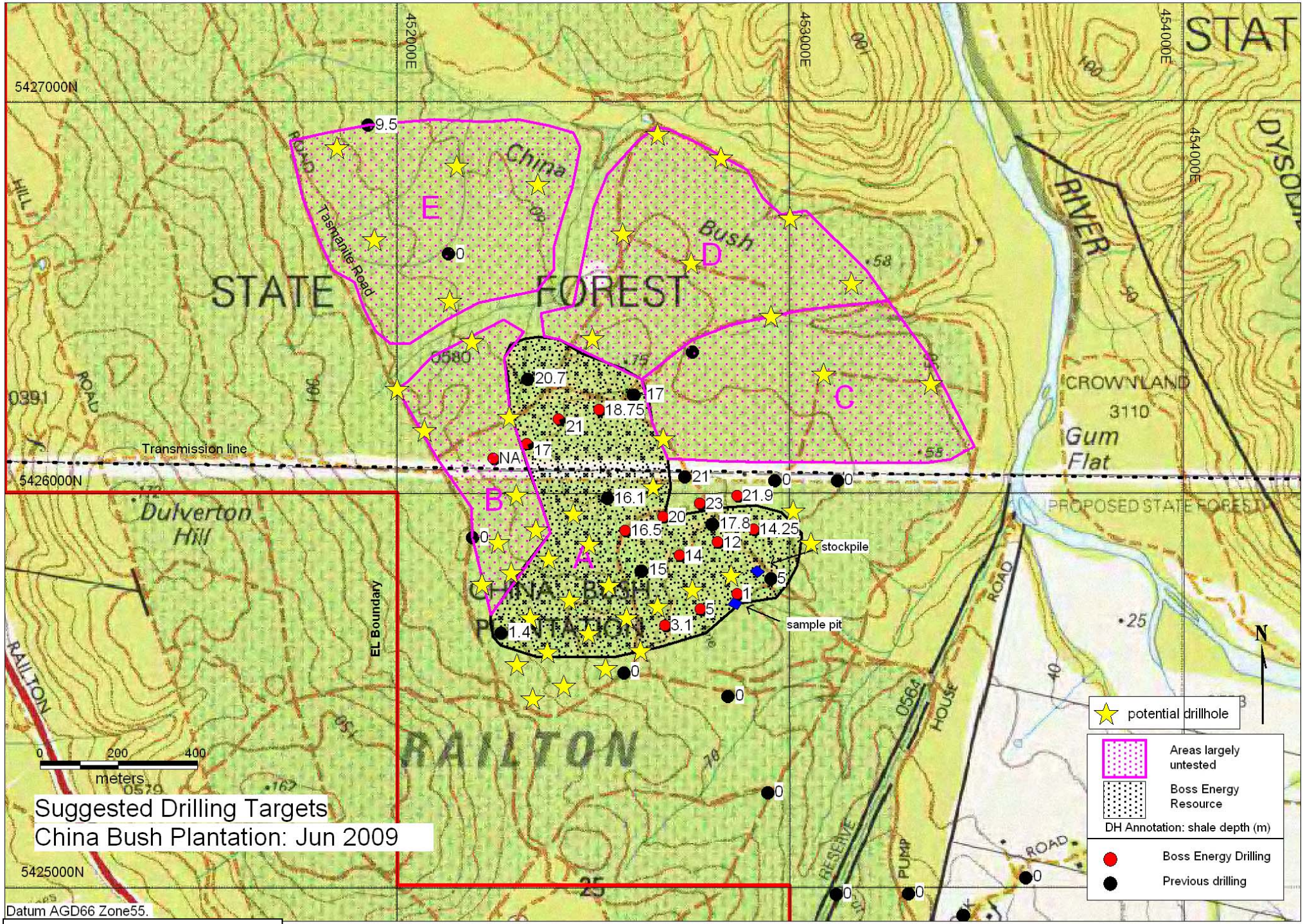

Fig 3. Suggested drilling program

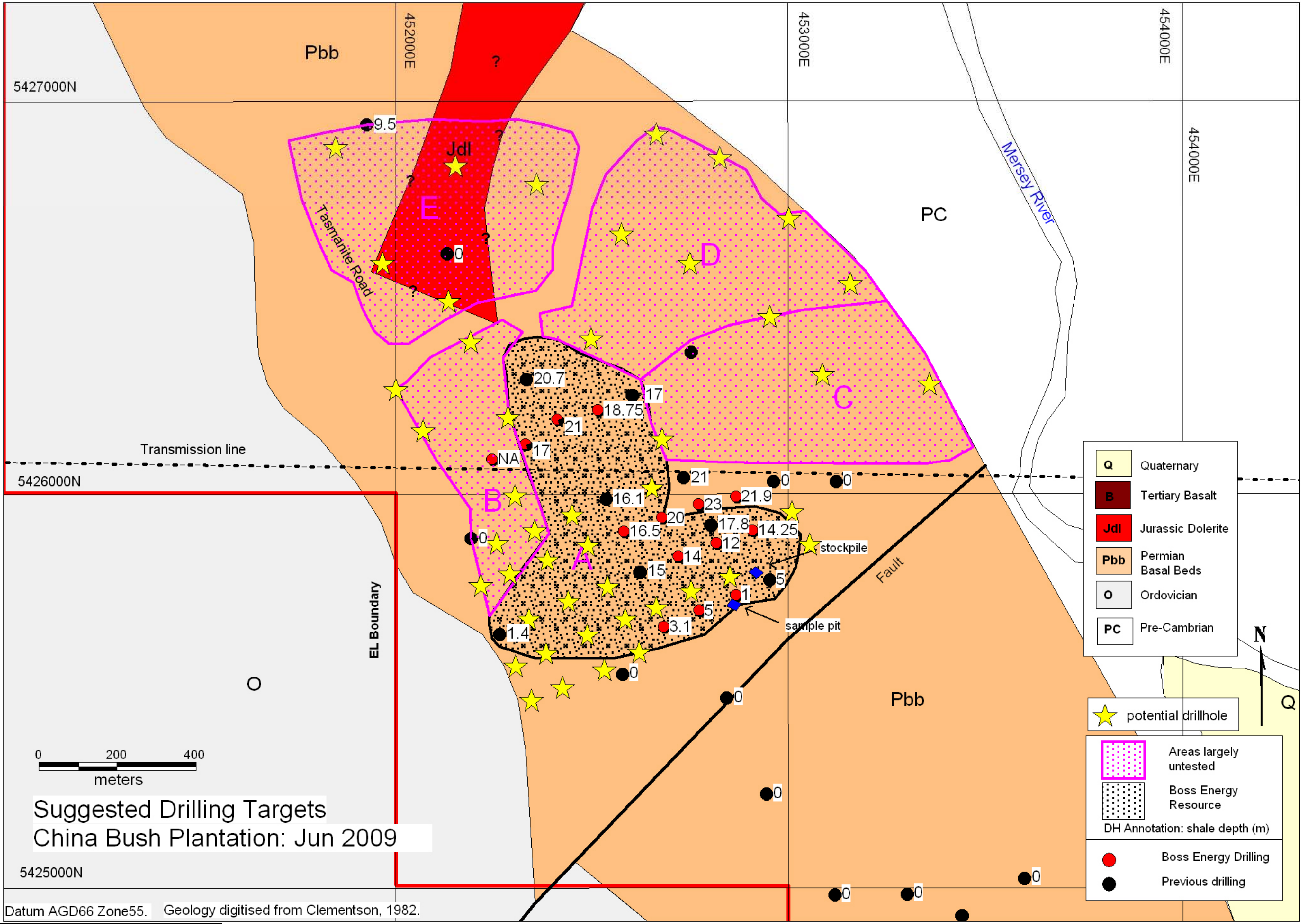

Fig 4. Geology

Discussion

The obvious discrepancy between the CRAE and Boss energy figures is due to the fact that the Boss Energy <20m shale occurrence is shown to a higher degree of confidence than the previous CRAE resource.

The category 'Inventory Coal' is not recognized as a publicly reportable resource category, but is acceptable for government and internal company reporting purposes. Inventory coal is a category not constrained by the phrase "reasonable prospects for economic extraction".

Figures 1. and 2. show that there is good potential to increase the known shallow resources of oil shale at the China Bush locality to the south west, and north east of Boss Energy drillholes, denoted in red. Drillholes unmarked or marked with NA, or a shale depth of zero did not intercept oil shale.

Land tenure and infrastructure

The China Bush area is State forest under management as a pine plantation by Forestry Tasmania and Timberlands Pacific. Much of the area has been recently harvested, or contains young trees, so access to the area is generally good. Compensation issues need to be managed where exploration impacts on the economic performance of the plantation.

A High Voltage 'network backbone' electricity transmission line bisects the China Bush resource area. The integrity of this infrastructure and effect on resources would need to be examined under any future mining plans.

Geological Constraints

The prospective area indicated in figures 1-4 is a north-west to south east zone of basal Permian sedimentary sequence rocks, which have potential to contain the Tasmanite seam. To the West and East of this zone are Ordovician and Pre-Cambrian sedimentary sequences, which are older than the Permian Tasmanite host, and therefore are generally not prospective, unless zones of overlying Permian rocks are found. The presence of a Jurassic Dolerite intrusion is indicated by a drillhole in the north (and in the western – most hole drilled by Boss Energy). The extent of this interpreted intrusion is not known, and could have an effect on potential shale availability, depending on whether the intrusion is larger or smaller. Locally, faulting and folding may dislocate the position of the shale up or down, so in some places the shale position may have been eroded away, and in others the shale may occur deeper than otherwise expected.

Suggested Drilling Program

In order to increase the known shale resource, particularly close to surface in the < 20m category, the following drilling program is recommended for consideration. The suggested program is divided into zones A-E, as indicated in figure 3. Preliminary costings indicate that the entire program could be executed for less than $100,000, or may be part completed on a zone by zone basis as indicated in Table 3.

Zone A
Figures quoted above as resource estimates for accessible shale less than 5 and less than 20 metres depth are uncertain, as almost half of the area included in the estimate to the south-west of BOE drilling is untested. An in-fill program in this area would confirm the presence of shale in the BOE resource area in preparation for upgrading to a JORC compliant resource[1]. Drilling in this area will have an impact on the recent re-planting of plantation pines, for which Plantation operator Timberlands Pacific will request compensation.

Zone B
Drilling in this area has the potential to increase the known shale occurrence in the <20 metre depth category. The area contained within Zone B may contain up to 300,000T of shale. Complications of this zone are a previous result of no shale recorded from CRAE drilling on the western boundary, a possible dolerite intrusion and negative result recorded near the power line, and the high tension power lines, which split the zone east-west.

Zone C -D
These zones have high potential for significantly expanding the shallow resource figures of oil shale. Zones C-D represent an area that theoretically may contain up to 1.5 million tonnes of shale. If half of this area were to be proved to bear shale at shallow depths, approximately 800,000T of shale would be added to resource figures. On the eastern side of Zones C and D, a boundary has been previously mapped with un-prospective Pre-Cambrian rocks. The position of the boundary may be interpreted , so it is possible that drill testing may shift the known boundary to the east or west.

Zone E
Zone E has an indicated intercept on the northern boundary, and was interpreted by CRAE to contain a dolerite intrusion, intercepted by the drill hole beneath the centre of the area. The extent of the dolerite body is marked on maps as an uncertain interpretation, therefore some, or all of the area marked in red as dolerite may be prospective for oil shale. The drill hole to the north of Zone E intercepted shale at 9.5m, and was considered to be fault bounded further to the north. The position of these holes is unusual, given the lack of road access. These holes may be incorrectly located, or may have been drilled at a time when access was available after land clearing.

[1] The key requirement of upgrading to a JORC compliant resource is demonstration of ‘reasonable prospects for eventual economic extraction’.

Potential Resources

Using the same parameters as for the resource calculations in Table 1 above, the following potential resource figures have been calculated. No account has been made for the effect of the dolerite intrusion shown in Fig 4.

Table 2. Potential resource figures.

Location	Category	Area Km^2	Shale Tonnes	Barrels	In Ground Value
China Bush	A	0.3688	968100	889000	**$71,116,000**
China Bush	B	0.1332	349650	321000	**$25,685,000**
China Bush	C	0.2664	699300	642000	**$51,370,000**
China Bush	D	0.2898	760725	699000	**$55,882,000**
China Bush	E	0.3021	793013	728000	**$58,254,000**

Suggested environmental program

In the event that an economic hydrocarbon extraction technique is found for the Tasmanite shale, and as a precursor to any mining operation to exploit the shale, it would be appropriate that an environmental monitoring program be conducted. A baseline study of water quality in the area is suggested, to establish existing conditions for parameters such as water-bourn hydrocarbons, nutrients, acidity and dissolved metals over a 12 month period, for several locations at the China Bush site.

Preliminary Cost Estimate

Calculations below are based on a drilling rate of $48 per metre (current June'09), and average drilling depth of 25 metres. Mobilization, consumables, estimated supervision costs and 15% contingency are also included. Extra track preparation work may be necessary in zones A-B.

Table 3. Drill program cost estimate

zone	Drillholes	Cost estimate
A	20	$40,000
B	9	$18,000
C	4	$8,000
D	7	$14,000
E	4	$8,000
Environmental program,		$10,000
Grand Total		**$96,419**

References

Australian guidelines for estimating and reporting of Inventory Coal, Coal Resources and Coal Reserves, prepared by The Coalfields Geology Council of New South Wales and the Queensland Mining Council.

Clementson, I.M., 1982, *Railton EL 4/74 Final report on 1982 drilling*, CRA Exploration PTY. LTD., MRT report 82_1789