Author: Aaron Dutton

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Te Kuha Resource Model Report

Client Name: Stevenson Mining Te Kuha Ltd

Client Address: 99 Gavin Street, Ellerslie
Auckland 1060
Private Bag 94000,
Manukau 2241

Distribution: None
(other than client)

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Reviewed by:
Name & Designation: Adrian Field
Competent Geologist

Reviewed by:
Name & Designation: Dr Nigel Newman
Senior Geologist

Approved by:
Name & Designation: Dr James Pope
Competent Geologist

CRL Energy Ltd

68 Gracefield Road,
PO Box 31-244
Lower Hutt 5040
New Zealand
TEL +64 4 570 3700
FAX +64 4 570 3701
www.crl.co.nz

CHRISTCHURCH OFFICE
97 Nazareth Avenue
PO Box 29415
Christchurch 8540
New Zealand
TEL +64 3 341 2120
FAX +64 3 341 5500

HAMILTON OFFICE
C/- Ruakura Research Centre
Private Bag 3123
Hamilton 3240
New Zealand
TEL +64 7 929 4864
FAX +64 7 929 4865

GREYMOUTH OFFICE
43 Arney Street
PO Box 290
Greymouth 7840
New Zealand
TEL +64 3 768 0586
FAX +64 3 768 0587

BULLER OFFICE
25 Palmerston Street
PO Box 321
Westport 7866
New Zealand
TEL +64 3 789 7289
FAX +64 3 789 7489

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1. Scope and Introduction

In March 2012 Stevenson Mining Te Kuha Ltd (SMTKL) engaged CRL Energy Ltd (CRL) to undertake detailed literature review, drilling program planning, supervision, data management and geological resource modelling for the Te Kuha prospect.

This report details:

- the geological coal-in-ground resource identified by this geological investigation and modelled using Leapfrog Mining version 2.5.1.13
- the assumptions used in modelling
- the JORC resource status of each resource block
- the coal tonnages of each block (assuming average coal density of 1.3 tonnes per cubic metre)
- a summary of data points used in the model (Appendix 1: Fault Data; Appendix 2: Structural Data; Appendix 3: Coal Point Data)
- CSV database files used for import into Leapfrog Mining (Appendix 4: CSV import files for Te Kuha Model)

Use of data contained in this report

The resources estimated in this report have been compiled by competent geologists as defined in the AusIMM JORC code for resource reporting (JORC, 2004).
Release of any information contained in this report beyond the intended recipient can only occur with permission of the authors. This report should not be released in part and should only be quoted in full. There are three related reports on the drilling programme and coal quality that provide material and essential information to further assessment of the Te Kuha Report beyond the geology and coal tonnage (Newman, 2012; Rogers, 2012a and Rogers, 2012b)

2. Geology

The Te Kuha deposit is located 10km southeast of Westport on the northern side of the Buller River (Figure 1). The deposit is an erosional remnant of both Brunner and Paparoa Coal Measures which lie upon Hawks Crag Breccia.

The oldest unit observed from drilling in the immediate Te Kuha deposit area is the mid-Cretaceous Hawks Crag Breccia (Figure 2). It typically consists of greenish grey greywacke, schist, and granitoid breccia. This unit was used as a basement indicator during drilling. The full thickness of this unit was not intersected during drilling but is estimated up to 200m thick (Western Coal Mining, 1986). Formation thickness for the Hawks Crag Breccia varies markedly due to paleotopography.

Overlying the Hawks Crag Breccia are Paparoa Coal Measures. These have not been previously mapped or identified in this area. Historical work had interpreted these rocks to be a sub-unit of the Eocene Brunner Coal Measures. Recent drilling has confirmed the existence of a multiple seam deposit with Paparoa coal verified by

petrological analyses (Newman, 2012). The Cretaceous Paparoa Coal Measures are typically interbedded carbonaceous, quartz-lithic granule conglomerates and slightly carbonaceous siltstones and mudstones. Coal within the Te Kuha Paparoa Coal Measures includes multiple, very thin seams (<0.2m) and one thick seam (typically >8m) that thins and splits to the north and northwest. Total unit thickness from drillhole data is approximately 100m. The formation is thinner in areas where a basement high has been identified in drilling.

Overlying the Paparoa Coal Measures is the Brunner Coal Measures, presumed to be of Eocene age by analogy with dated Brunner Coal Measures further north. This unit consists of thick, channelized quartzose to quartz- lithic sandstones and carbonaceous mudstones. The true contact between Paparoa and Brunner Coal Measures is unknown until dating evidence is available, but as a working hypothesis has been placed at the base of the first distinctive conglomerate underlying a sequence of thick, channelized sandstones and the Brunner seam (Figure 2). This aspect is discussed further in a separate report (Newman, 2012).

The coal within the Brunner Coal Measures at Te Kuha is typically in a single thick seam (>5m) with a carbonaceous mudstone roof and a thick gradational base of interbedded high ash coal and highly carbonaceous mudstone. The upper contact of the Brunner Coal Measures has not been observed in the coalfield.

Bedding data from mapping and drill core suggests a gentle to moderate (8-35°) west to northwest dipping trend for Te Kuha sediments.

The Te Kuha deposit is faulted and exhibits markers of landslide topography (Western Coal Mining Ltd, 1986; Tonkin and Taylor Ltd, 2002). Numerous faults have been identified, mainly by topographic interpretation and outcrop/drillhole geology. The majority of these faults are likely to be closely related to joint orientations measured in the deposit area which are sub-vertical (Western Coal Mining Ltd, 1986). The deposit has likely undergone gravitational block slumping in a west to northwest direction propagating away from the main southern ridgeline.

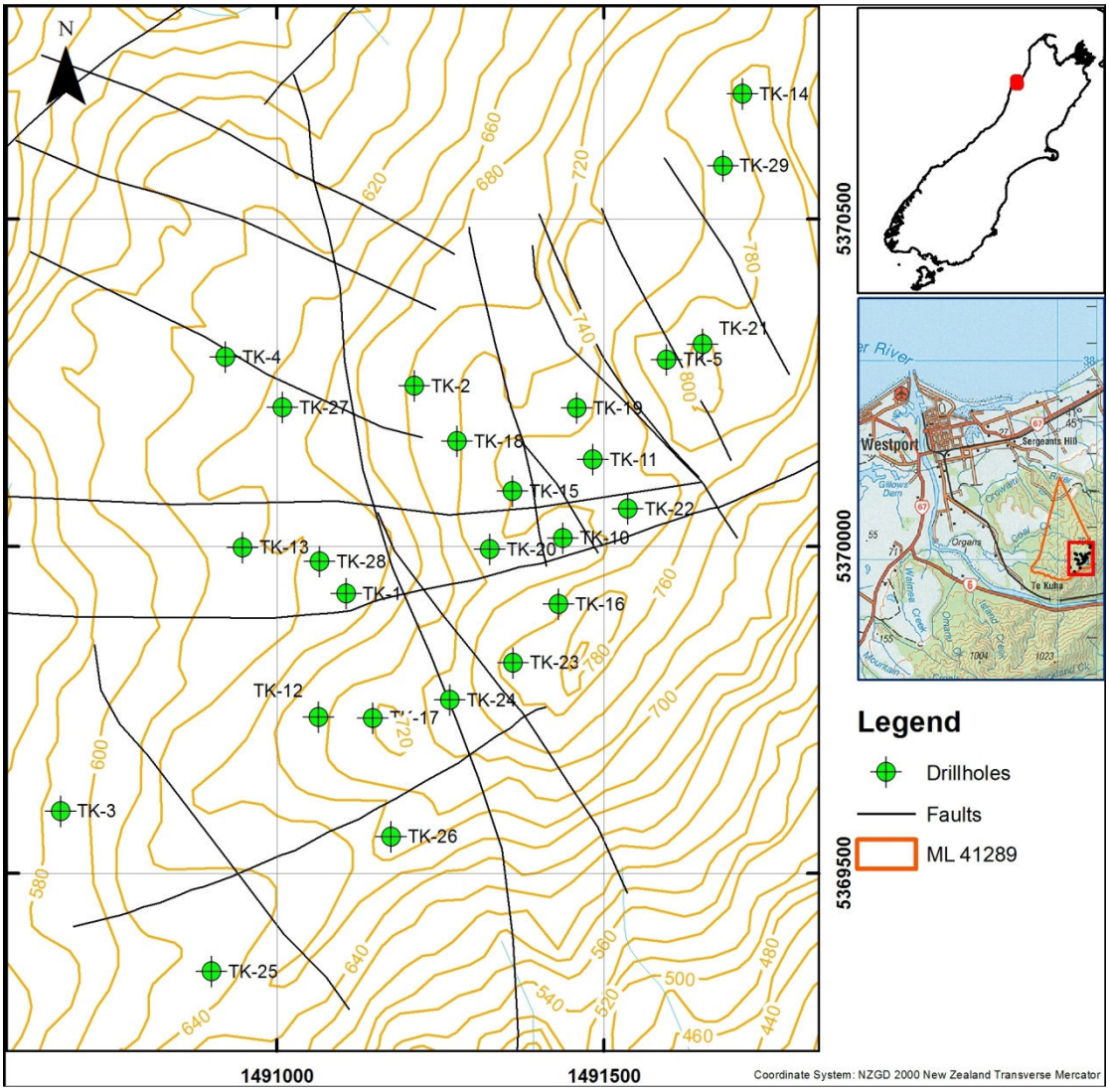

Figure 1: Te Kuha Prospect

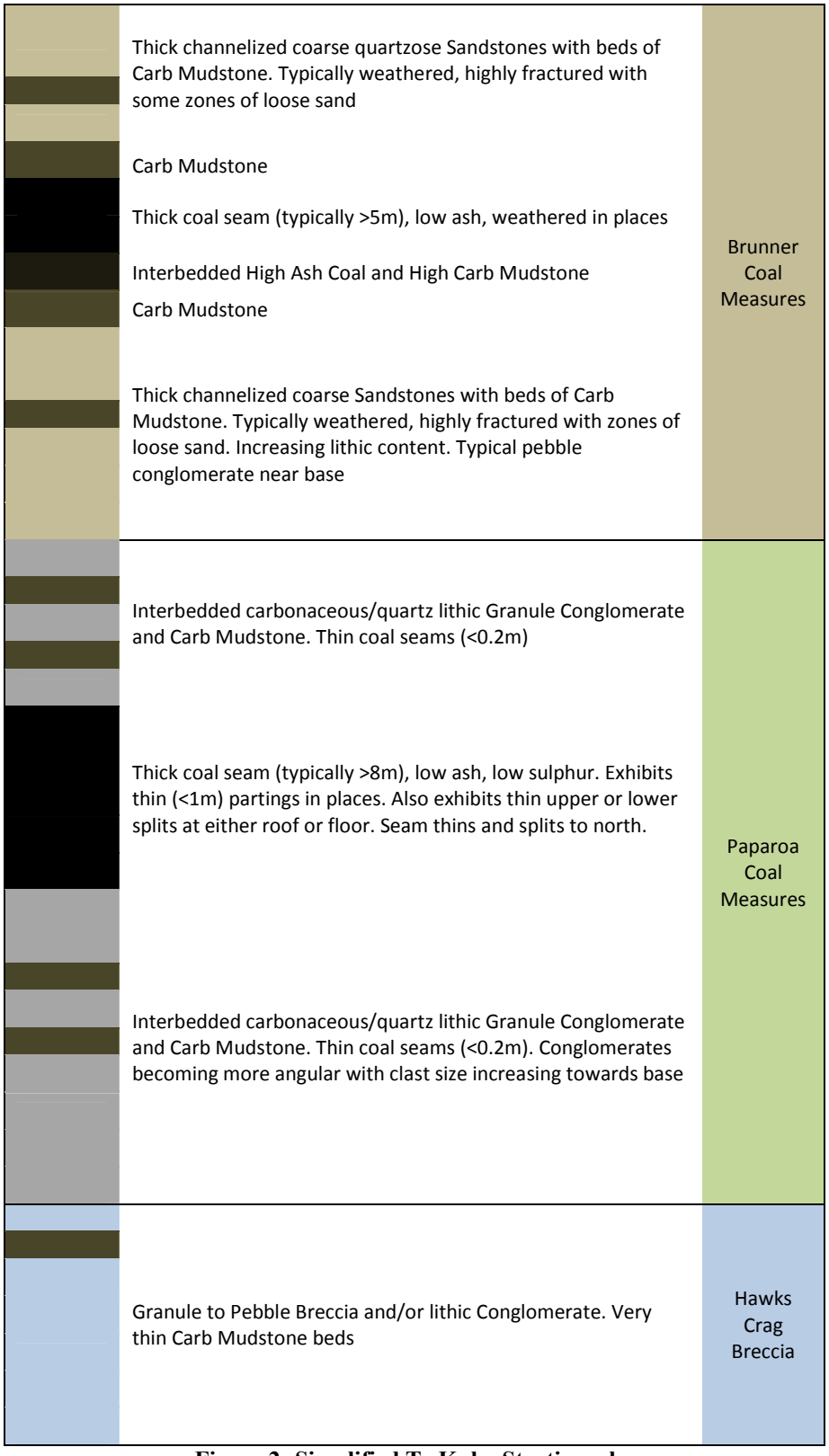

Figure 2: Simplified Te Kuha Stratigraphy
(Note: Carb = Carbonaceous)

3. Data and Modelling Methods

3.1 Data Sources

Data sources for the current Te Kuha resource model include the recent drilling, field investigations and coal quality analysis program. Information from previous studies was also used in the model including drillhole data, outcrop and mapping data, and coal quality analyses (NZ Cement Holdings Ltd, 1986; NZ Cement Holdings Ltd, 1986a; Western Coal Mining Ltd, 1986b; Yardley and Black, 1994).

3.2 Assumptions

3.2.1 Historical Data

Historical investigations identified geological structures that defined resource blocks for assessment of coal tonnages and quality. Where possible, the recent field program (drilling and mapping programs included) built on geological structures and refines the reliability of resource block assessments. In addition, with the benefit of the latest geological work program, we are able to provide a revised interpretation of the geology of the Te Kuha deposit.

Most historic field data points have been revisited and assessed for validity in spatial accuracy and geological data quality. Most historic data points have been located in the field. The majority of old data points from previous field programs proved accurate and we have assumed the remainder of data points are also reliable. Where historic data has proved inaccurate revisions to the geology of the Te Kuha deposit have been made. If the historic data point is not accurately mapped it is noted in the "Collar" CSV file (Appendix 4: CSV import files for Te Kuha Resource Model)

Spatial accuracy was refined using GPS, updated aerial photography interpretation and Light Detection and Ranging (LIDAR) data interpretation. Geological data from historic points was refined by retrenching, sampling, and laboratory coal quality analysis.

Historical drillcore geology logs were digitised and then adjusted to the current unit classification based on available laboratory coal analysis data (3.2.2 Resource Model). Historical geological logs have been geophysically adjusted (Table 1).

Table 1: Historic Drillholes

Historic Drillhole	Adjusted for current coal quality unit classification?	Geophysics adjusted?	Comments
TK-1	Yes	Yes	
TK-2	No	Yes	No coal quality data
TK-3	n/a	n/a	No coal intersected
TK-4	n/a	n/a	No coal intersected
TK-5	Yes	Yes	
TK-10	Yes	Yes	
TK-11	Yes	Yes	
TK-12	Yes	Yes	Re-interpreted by CRL as non-coal at top of hole. Confirmed by blast trenching at collar location.
TK-13	No	Yes	No coal quality adjustment needed
TK-14	n/a	n/a	No coal intersected
TK-15	Yes	Yes	
TK-16	No	Yes	No coal quality adjustment needed

3.2.2 Resource Model

3.2.2.1 Modelling Rules

The Te Kuha deposit contains multiple fault-intersected and fault-bounded resource blocks, multiple split and thinning seams and thick units of interbedded High Ash Coal and High Carb Mudstone immediately below the Brunner Main Seam. Robust modelling rules are needed for resource calculation.

"Seams", "Splits" and "Partings" were modelled using the Leapfrog Mining Version 2.5.1.13. All three of these entities are defined with respect to distinct lithological "Units".

Resource volumes of these "Seams", "Splits" and "Partings" were estimated using the vein and domain functions within the Leapfrog software. "Seams" and "Splits" are included in the coal resource whereas "Parting" volumes are subtracted from "Seam" volumes and are therefore not included in the final coal resource. Entire "Seams" (limited by an inferred "zero thickness" extent) were modelled using the Leapfrog vein function to determine thickness gradients. From the thickness gradients of the modelled "Seams" 0.5m thickness cut-off polylines were inferred and domains modelled to the cut-off points. The volume of these domains was then extracted for resource estimation. "Splits" and "Partings" are modelled to a zero-thickness extent using the domain function alone.

A "Unit" is the Rock Mass Unit (RMU) as defined in the "Lith_Code" field of lithological logs e.g. Coal, High Ash Coal, High Carb Mudstone, Fine Sandstone etc (Figure 3; Rogers, 2012a). Rock Mass Units are lithologically and/or structurally

distinct mass units of rock (typically over 0.3m, but can be thinner if exhibiting important distinctions from surrounding rock mass).

Coal and highly carbonaceous units were defined during logging using ash content from laboratory results (where possible) and visual estimates. Three main logging units are used for coal and highly carbonaceous mudstone:

Coal: <15% Ash
High Ash Coal: 15-35% Ash
High Carb Mudstone: 35-50% Ash

Coal and high ash coal units were included in resource modelling. High carb mudstone units were not.

Hole_id	From	To	Interval	Formation	Lith_Code	Interbedded_lith	Seam_Code
TK-24	65.91	66.15	0.24	Paparoa Coal Measures	High Carb Mudstone		
TK-24	66.15	66.2	0.05	Paparoa Coal Measures	Coal		Paparoa Main Seam
TK-24	66.2	67	0.8	Paparoa Coal Measures	Lost Core		Paparoa Main Seam
TK-24	67	67.2	0.2	Paparoa Coal Measures	Coal		Paparoa Main Seam
TK-24	67.2	67.75	0.55	Paparoa Coal Measures	Lost Core		Paparoa Main Seam
TK-24	67.75	68.3	0.55	Paparoa Coal Measures	Lost Core		
TK-24	68.3	68.36	0.06	Paparoa Coal Measures	High Carb Mudstone		
TK-24	68.36	68.81	0.45	Paparoa Coal Measures	Fine Sandstone		
TK-24	68.81	69.41	0.6	Paparoa Coal Measures	High Ash Coal		Paparoa Thin Seam 1
TK-24	69.41	69.85	0.44	Paparoa Coal Measures	Fine Sandstone	Coarse Sandstone	

Figure 3: Example excerpt from full lithology log

A "Seam" within the Te Kuha deposit model is defined as a unit or collection of adjoining units of Coal and/or High Ash Coal of at least 0.5m thickness. A seam must be separated from the next seam by at least a thickness of 1m of non-coal.

If thin units (>0.2<0.5m) of Coal and/or High Ash Coal are separated from a seam by less than 1m of non-coal then those units are classified as a "Split" of that particular seam (Figure 4). This situation commonly occurs at either the top and/or bottom of a seam, therefore "Upper Split" and "Lower Split" prefixes have been used in the model naming convention.

Logging units	Thickness Range	Included in resource calculations? (Green = Yes, Red = No)
Coal and/or High Ash Coal	>0.5m	Seam e.g. Paparoa Main Seam
Non-coal	<1.0m	
Coal and/or High Ash Coal	>0.2<0.5m	Seam Split e.g. Lower Split Paparoa Main Seam

Figure 4: Modelling Rules - seam classification

If a thick seam includes minor non-coal "Partings" of less than 1.0m thickness (characteristic of Paparoa coals) where each Coal and/or High Ash Coal intersection is greater than 0.5m then these partings are modelled and extracted from the coal volume (Figure 5).

Logging units	Thickness Range	Included in resource calculations? (Green = Yes, Red = No)
Coal and/or High Ash Coal	>0.5m	Seam e.g. Paparoa Main Seam
Non-coal	<1.0m	Parting e.g. Upper Parting Paparoa Main Seam
Coal and/or High Ash Coal	>0.5m	Seam e.g. Paparoa Main Seam
Non-coal	<1.0m	Parting e.g. Lower Parting Paparoa Main Seam
Coal and/or High Ash Coal	>0.5m	Seam e.g. Paparoa Main Seam

Figure 5: Modelling Rules - partings

In instances where two units were interbedded the major unit was used to define whether it was included in the resource modelling e.g. an interbedded unit of High Ash Coal (dominant) and High Carb Mudstone (sub-dominant) is included in the resource whereas an interbedded unit dominant in High Carb Mudstone is not (Figure 6).

Logging units	Thickness Range	Included in resource calculations? (Green = Yes, Red = No)
Coal and/or High Ash Coal	>0.5m	Seam e.g. Brunner Main Seam
High Ash Coal / High Carb Mudstone	>0m	
High Carb Mudstone / High Ash Coal	>0m	

Figure 6: Modelling Rules - interbedded units

A schematic diagram of modelling rules is presented as Figure 7.

The lithology data used in the model is a simplified version of the full lithology logs (Appendix 4: CSV import files for Te Kuha Resource Model; Rogers, 2012a). All seams and splits are designated in the "Seam_Code" field of the lithology logs. The simplified lithology supersedes the original "Lith_Code" units by naming either "Coal" (part of a seam or split) or "Non coal" (everything else, Figure 8).

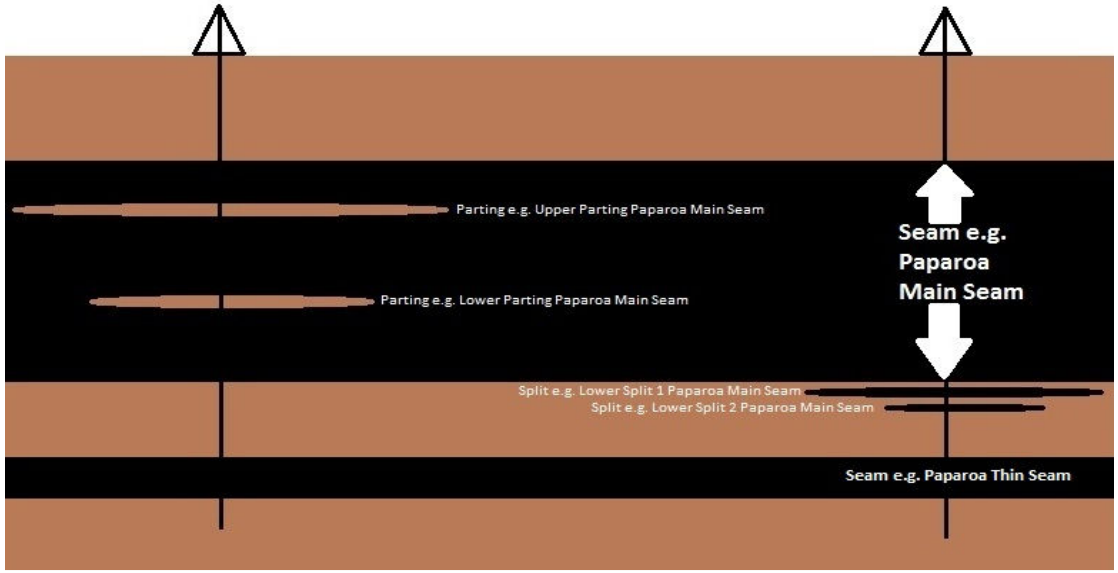

Figure 7: Schematic diagram of seam, split and parting classification

Hole_id	From	To	Interval	Formation	Lith_Code	Interbedded_lith	Seam_Code
TK-24	65.91	66.15	0.24	Paparoa Coal Measures	High Carb Mudstone		
TK-24	66.15	66.2	0.05	Paparoa Coal Measures	Coal		Paparoa Main Seam
TK-24	66.2	67	0.8	Paparoa Coal Measures	Lost Core		Paparoa Main Seam
TK-24	67	67.2	0.2	Paparoa Coal Measures	Coal		Paparoa Main Seam
TK-24	67.2	67.75	0.55	Paparoa Coal Measures	Lost Core		Paparoa Main Seam
TK-24	67.75	68.3	0.55	Paparoa Coal Measures	Lost Core		
TK-24	68.3	68.36	0.06	Paparoa Coal Measures	High Carb Mudstone		
TK-24	68.36	68.81	0.45	Paparoa Coal Measures	Fine Sandstone		
TK-24	68.81	69.41	0.6	Paparoa Coal Measures	High Ash Coal		Paparoa Thin Seam 1
TK-24	69.41	69.85	0.44	Paparoa Coal Measures	Fine Sandstone	Coarse Sandstone	

Hole_id	From	To	Formation	Lith_Code	Seam_Code
TK-24	65.91	66.15	Paparoa Coal Measures	Non Coal	
TK-24	66.15	66.2	Paparoa Coal Measures	Coal	Paparoa Main Seam
TK-24	66.2	67	Paparoa Coal Measures	Coal	Paparoa Main Seam
TK-24	67	67.2	Paparoa Coal Measures	Coal	Paparoa Main Seam
TK-24	67.2	67.75	Paparoa Coal Measures	Coal	Paparoa Main Seam
TK-24	67.75	68.3	Paparoa Coal Measures	Non Coal	
TK-24	68.3	68.36	Paparoa Coal Measures	Non Coal	
TK-24	68.36	68.81	Paparoa Coal Measures	Non Coal	
TK-24	68.81	69.41	Paparoa Coal Measures	Coal	Paparoa Thin Seam 1
TK-24	69.41	69.85	Paparoa Coal Measures	Non Coal	

Figure 8: Merging process for Leapfrog import

3.2.2.2 Faulting influence on resource blocks

Interpretation of faulting through the prospect was completed using a combination of aerial photography interpretation, LIDAR elevation points and LIDAR generated topographic surfaces, 3D geological modelling, reinterpreting historical fault interpretations and on-site mapping. The current faulting interpretation is modified from the faults interpreted by historical investigations. The interpreted offsets on these faults are different from previous geological models, largely because historical interpretations of the deposit were based on a single seam model.

The delineation of resource blocks is influenced by faults and seam thinning trends as interpreted from drilling intersections and outcrop. Many more faults will be present within the deposit but current data density is insufficient to identify these structures.

3.2.2.3 Coal Density

Average coal density is assumed to be 1.3t/m^3. This value was used as a conservative default for clean coal after reviewing available washability and density data for similar deposits (Newman, 2012). High ash coal will be greater than 1.3t/m^3 density but there is currently insufficient density analysis data available for the Te Kuha deposit to conclude a useful High Ash Coal default density. Therefore all modelled seam and split (High Ash Coal inclusive) tonnages have been estimated using 1.3t/m^3.

4. Resource Blocks

4.1 Summary

The Te Kuha deposit is divided into 12 resource blocks (Figure 9, Figure 10). Geological resources have been calculated for each block and assigned certainty (inferred, indicated and measured) based on the amount and quality of the data within each block and the continuity of data from surrounding blocks (Table 2). Coal tonnages have been calculated based on volumes in each resource block and the coal density. Two significant figure rounding has been applied after the resources in each block are added together to give the figure for the total resource. Where applied, rounding has been noted in the tables.

The coal resource has been split up in a variety of ways to indicate the proportions of the resource that are:

- Paparoa vs Brunner Coal (Table 3)
- Inferred, indicated or measured (Table 3)
- In water conservation land, stewardship land or scenic reserve (Figure 11, Table 4)
- Within the current permit or within the application for extension (Table 5)

In the descriptions all coal resources can be assumed to be in Buller District Council administered water conservation land unless otherwise stated.

The resource estimates below are generated using all current known data sets at the time of issue of this report. Should further exploration work be completed the accuracy of the resource estimates contained in this report can no longer be guaranteed and the models and assumptions made to generate these resource estimates should be re-evaluated.

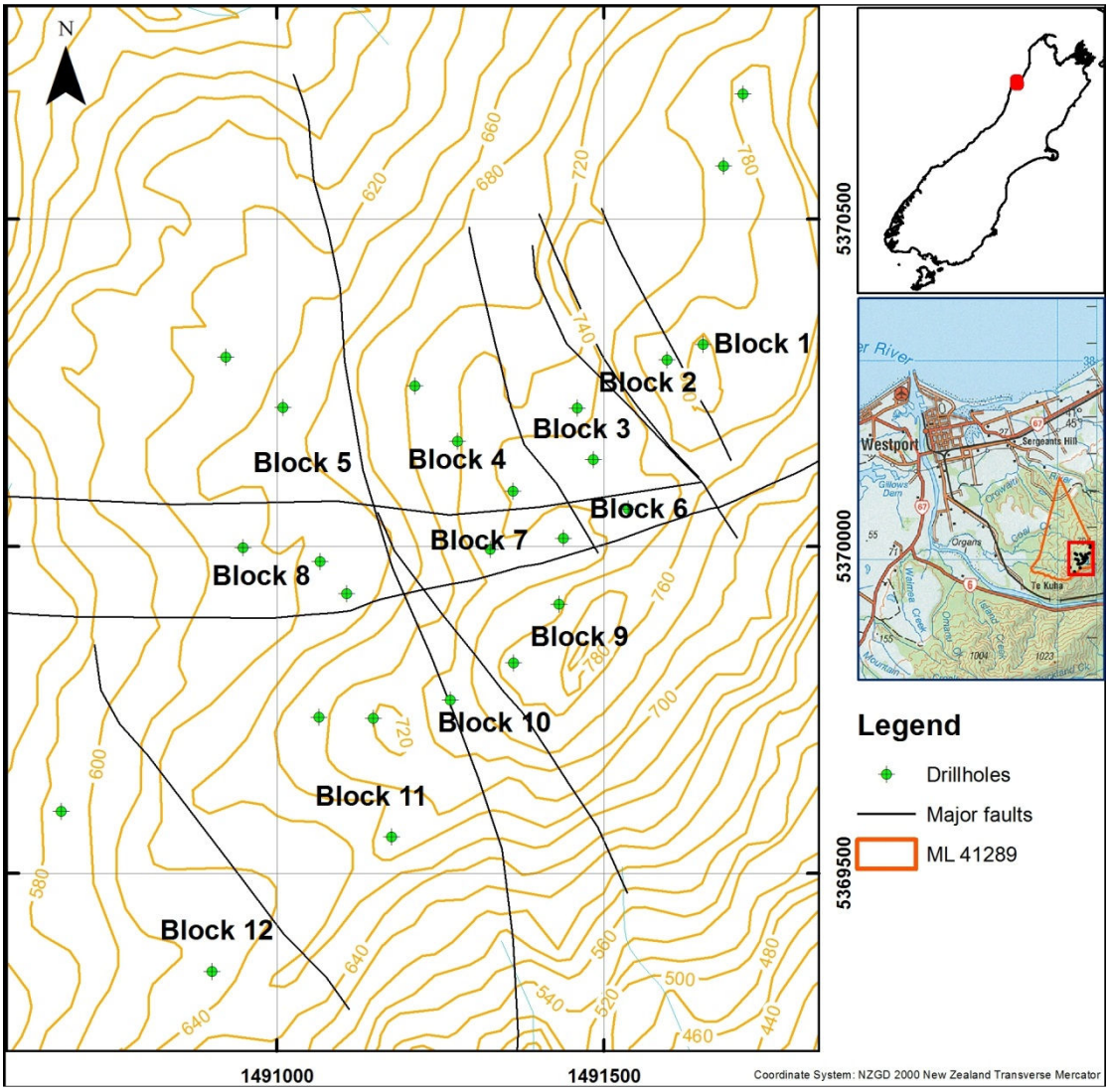

Figure 9: Te Kuha Resource Blocks

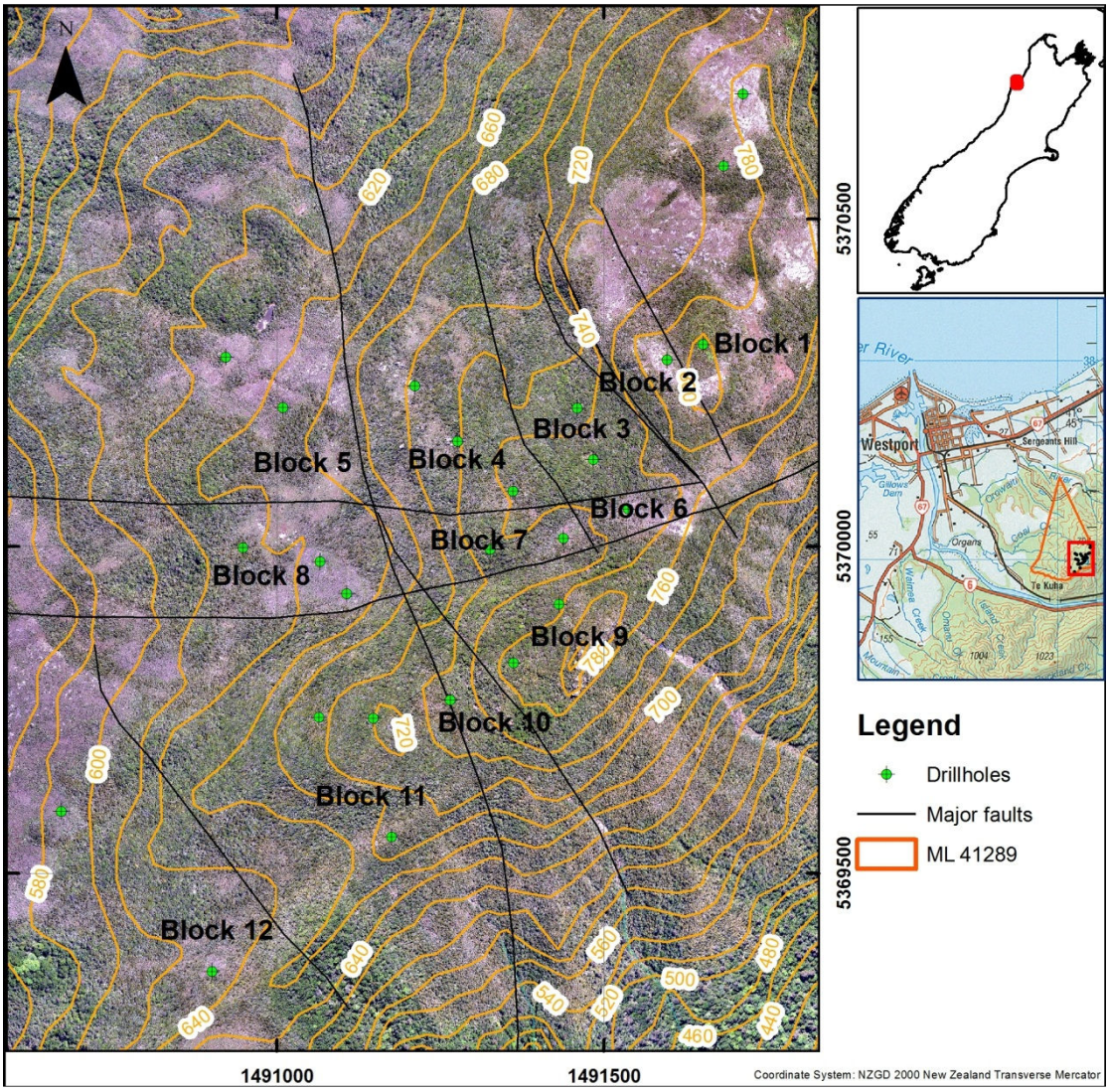

Figure 10: Resource Blocks on Aerial Photography

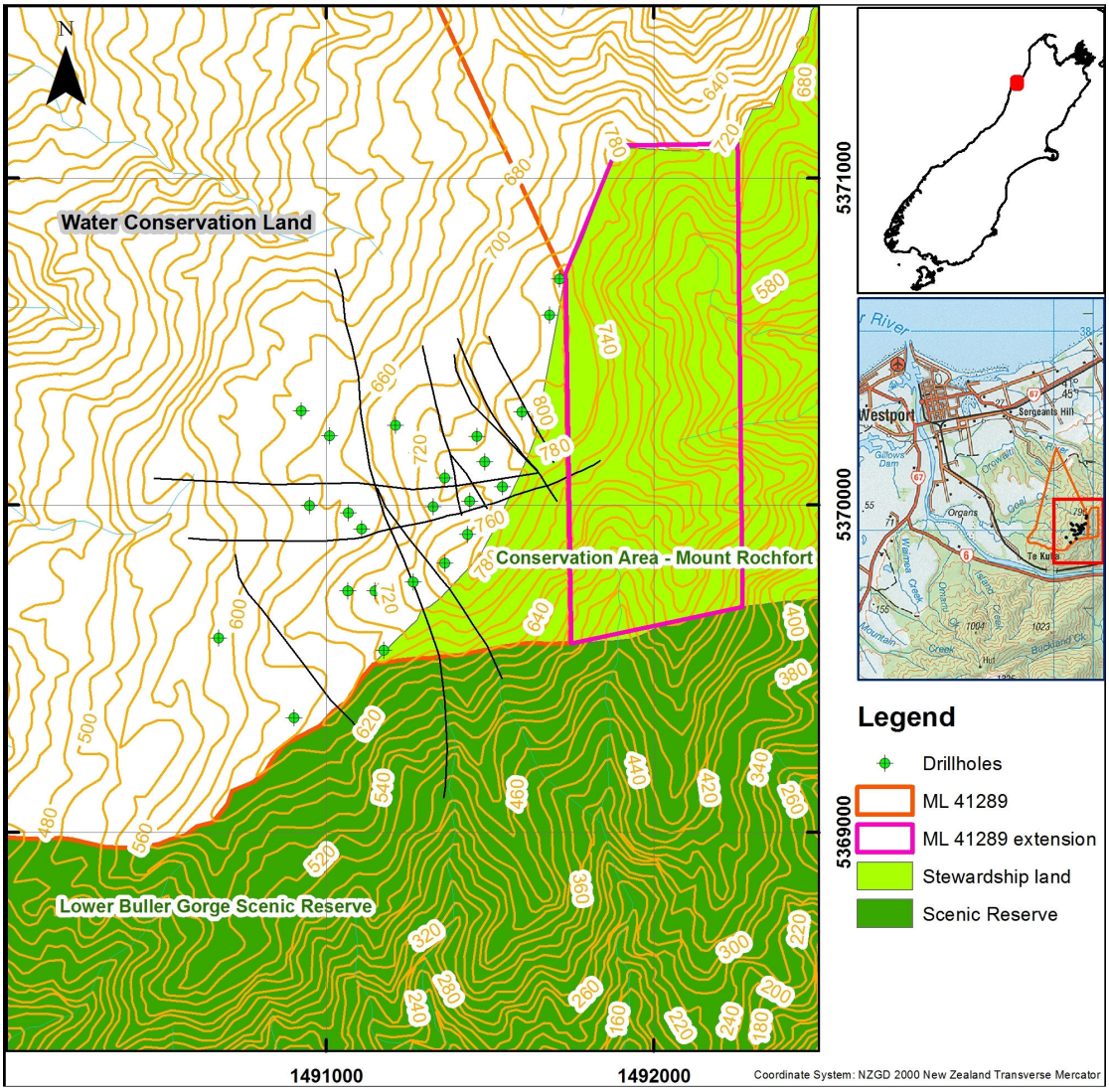

Figure 11: DOC Land

Table 2: Coal Resource by Block

Modelled Unit	Volume (m^3)	Domain Resolution	Thickness cut-off applied?	Tonnes	Resource Status	Percentage in DOC Stewardship land	Percentage in DOC Scenic Reserve	Percentage coal outside Permit 41289 (Current Boundary)	Notes
Block 1									
Brunner Main Seam	204050	5	No, not required due to seam shape	265265	Measured	52%	0%	1%	Permit boundaries are under application for extension to include all of this block's resource
Block 2									
Brunner Main Seam	159230	5	No, not required due to seam shape	206999	Measured	23%	0%	0%	Based on continuation of geological trends from Block 1 and validated outcrops
Blocks 1 and 2									
Paparoa Main Seam (0.5m Cutoff)	278810	5	Yes, 0.5m	362453	Inferred	99%	0%	78%	Permit boundaries are under application for extension to include all of this block's resource
Block 3									
Brunner Main Seam	219180	5	No, not required due to seam shape	284934	Indicated	4%	0%	0%	
Paparoa Seam 1 (0.5m Cutoff)	66946	5	Yes, 0.5m	87030	Inferred	6%	0%	0%	
Paparoa Seam 2 (0.5m Cutoff)	10607	5	Yes, 0.5m	13789	Inferred	0%	0%	0%	
Total Paparoa	77553	[redacted]	[redacted]	100819	Inferred	6%	0%	0%	[redacted]
Block 4									
Brunner Main Seam	561020	5	No, not required due to seam shape	729326	Measured	0%	0%	0%	
Block 5									
Brunner Main Seam (0.5m Cutoff)	193130	5	Yes, 0.5m	251069	Inferred	0%	0%	0%	Almost poorly Indicated - requires drilling to elevate status
Block 6									
Paparoa Main Seam	39054	5	No, not required due to seam shape	50770	Indicated	35%	0%	0%	Based on continuation of geological trends from Blocks 1, 2, 3, 7 and 9
Block 7									
Block 7a									
Paparoa Thin Seam (0.5m Cutoff)	254	5	Yes, 0.5m	331	Indicated	0%	0%	0%	Based on continuation of geological trends from Blocks 3, 4, 6 and 9
Paparoa Main Seam (0.5m Cutoff)	23961	5	Yes, 0.5m	31149	Indicated	0%	0%	0%	Based on continuation of geological trends from Blocks 3, 4, 6 and 9
Total Paparoa	24215		[redacted]	31480	Indicated	0%	0%	0%	[redacted]
Block 7b									
Brunner Main Seam (0.5m Cutoff)	69325	5	Yes, 0.5m	90123	Indicated	0%	0%	0%	Based on continuation of geological trends from Blocks 4, 8 and 10
Block 8									
Brunner Main Seam (0.5m Cutoff)	142650	5	Yes, 0.5m	185445	Indicated	0%	0%	0%	Well indicated. Note: Coal volume does not include rock partings

Modelled Unit	Volume (m^3)	Domain Resolution	Thickness cut-off applied?	Tonnes	Resource Status	Percentage in DOC Stewardship land	Percentage in DOC Scenic Reserve	Percentage coal outside Permit 41289 (Current Boundary)	Notes
Block 9									
Paparoa Main Seam (0.5m Cutoff)	806840	5	Yes, 0.5m	1048892	Measured	62%	0%	0%	
Lower Split 1 Paparoa Main Seam	67	5	No, coal intersection not thicker than 0.5m. Assumed ply mined with Paparoa Main Seam above	87	Measured	0%	0%	0%	
Lower Split 2 Paparoa Main Seam	13	5	No, coal intersection not thicker than 0.5m. Assumed ply mined with Paparoa Main Seam above	17	Measured	0%	0%	0%	
Total Paparoa	806920			1048995	Measured	62%	0%	0%	
Block 10									
Brunner Main Seam (0.5m Cutoff)	5414	5	Yes, 0.5m	7039	Indicated	0%	0%	0%	
Paparoa Main Seam (0.5m Cutoff)	157020	5	Yes, 0.5m	204126	Indicated	65%	0%	0%	
Lower Split Paparoa Main Seam (0.5m Cutoff)	101	3	Yes, 0.5m	131	Indicated	0%	0%	0%	
Paparoa Thin Seam (0.5m Cutoff)	5135	5	Yes, 0.5m	6675	Indicated	0%	0%	0%	
Total Paparoa	162256			210932	Indicated	63%	0%	0%	
Block 11									
Paparoa Main Seam (0.5m Cutoff)	396240	5	Yes, 0.5m	515112	Indicated	29%	24%	24%	Note: Coal volume does not include rock partings. All coal in Scenic Reserve is outside Permit 41289
Block 12									
Paparoa Main Seam (0.5m Cutoff)	41381	5	Yes, 0.5m	53795	Inferred	0%	64%	64%	All coal in Scenic Reserve is outside Permit 41289

Table 3: Coal Resource Summary

Modelled Units	Percentage of resource	Tonnes
Total Brunner Inferred	12%	251069
Total Brunner Indicated	28%	567540
Total Brunner Measured	60%	1201590
Total Brunner	100%	2000000 (2 s.f.)
Total Paparoa Inferred	22%	517067
Total Paparoa Indicated	34%	808294
Total Paparoa Measured	44%	1048995
Total Paparoa	100%	2400000 (2 s.f.)
Total Inferred	**17%**	**770000 (2 s.f.)**
Total Indicated	**31%**	**1400000 (2 s.f.)**
Total Measured	**51%**	**2300000 (2 s.f.)**
TOTAL	**100%**	**4400000 (2 s.f.)**

(Note: Percentages calculated from unrounded totals)

Table 4: Resource Summary by land type

Modelled Units	Percentage of total coal resource	Tonnes
Brunner in DOC Scenic Reserve	0%	0
Paparoa in DOC Scenic Reserve	4%	160000 **(2 s.f.)**
TOTAL in Scenic Reserve	**4%**	**160000 (2 s.f.)**
Brunner in DOC Stewardship land	4%	200000 **(2 s.f.)**
Paparoa in DOC Stewardship land	30%	1300000 **(2 s.f.)**
TOTAL in Stewardship land	**34%**	**1500000 (2 s.f.)**
Brunner in BDC Water Conservation land	41%	1800000 **(2 s.f.)**
Paparoa in BDC Water Conservation land	21%	900000 **(2 s.f.)**
TOTAL in BDC Water Conservation land	**62%**	**2700000 (2 s.f.)**

(Note: BDC = Buller District Council. Percentages calculated from unrounded totals)

Table 5: Resource Summary within MP 41289

Modelled Units	Percentage of total coal resource	Tonnes
Total Brunner inside current boundaries	46%	2000000 **(2 s.f.)**
Total Paparoa inside current boundaries	44%	1900000 **(2 s.f.)**
TOTAL inside current boundaries	**90%**	**3900000 (2 s.f.)**
Total Brunner amended boundaries (if approved)	46%	2000000 **(2 s.f.)**
Total Paparoa inside amended boundaries (if approved)	50%	2200000 **(2 s.f.)**
TOTAL inside amended boundaries (if approved)	**96%**	**4200000 (2 s.f.)**
Total Brunner outside proposed new boundaries (Scenic Reserve)	0%	0
Total Paparoa outside proposed new boundaries (Scenic Reserve)	4%	160000 **(2 s.f.)**
TOTAL outside proposed new boundaries (Scenic Reserve)	**4%**	**160000 (2 s.f.)**

(Note: Percentages calculated from unrounded totals)

4.2 Block Delineation

4.2.1 Block 1

Block 1 is the furthest northeast of the resource blocks and incorporates the highest elevations of the deposit. The western boundary of Block 1 is fault defined with the north, east and southern boundaries topography controlled.

Block 1 has three drill holes (TK-14, TK-21 and TK-29) with six outcrop locations and excavations. TK-14 is a historic drill hole. The recent SMTKL drilling program has intersected a thick seam of Brunner coal (TK-21). The thick seam is interpreted to dip gently to the northwest.

A Paparoa seam is inferred to exist at depth, trending and thinning from outcrop ID 008 to ID 002/ID 003. This is yet to be confirmed by recent mapping or drilling. Drilling problems (hole stability and rig mechanical issues) in both TK-21 and TK-29 prevented completion of these drill holes in the target Hawks Crag Breccia basement (Rogers, 2012a). This Paparoa seam is interpreted to extend into Block 2 as the fault separating the two blocks may not exhibit any offset at depth.

The Brunner seam resource in the block is 204,050m^3 and 265,265t. The Paparoa seam resource in Blocks 1 and 2 combined is 278,810m^3 and 362,453t. The Brunner seam resource status is considered Measured. The Paparoa seam resource is considered Inferred.

In Block 1, 52% of the Brunner coal resource is within DOC Stewardship land (Figure 11). Stewardship land contains 99% of the Paparoa resource in blocks 1 and 2.

The current boundaries of Mining Permit 41289 include 99% of the Brunner seam resource and only 22% of the Paparoa resource in Blocks 1 and 2. The permit is currently under application to extend and include all of the Brunner and Paparoa coal in Blocks 1 and 2.

4.2.2 Block 2

Block 2 is situated to the west of Block 1 directly across a northwest (NW) to southeast (SE) trending fault. This fault is interpreted to have little vertical displacement. Block 2 is defined to both the east and west by faulted boundaries and is outcrop controlled to the north and south.

Block 2 has one historic drill hole (TK-5) and four historic outcrop locations (Figure 4). The drill hole and outcrops identified a thick coal seam of Brunner coal gently dipping to the northwest.

The Brunner seam resource in this block is 159,230m^3 and 206,999t. The Brunner seam resource status is considered Measured. 23% of the Brunner coal resource in Block 2 is within DOC Stewardship land. The Paparoa resource in Block 2 has been previously discussed in section 4.2.1.

4.2.3 Block 3

Block 3 is situated to the west of Block 2 directly across a major NW-SE trending fault. This fault is interpreted to have approximately 50m down-throw to the west. Block 3 is fault bounded to the east, south and west with interpreted outcrop control to the north.

Block 3 has two drill holes (TK-11 and TK-19) and no current outcrop data. A thick Brunner seam was intersected in the historic TK-11 drill hole. TK-19 intersected a thin, highly weathered Brunner seam with 2 thin Paparoa seams at depth.
It is likely that a large section of the upper 10-20m of rock in Block 3 is not in-situ as topography and geotech logging suggests a slump deposit. This has been suggested in historic interpretations and recent coal quality analysis of the upper seam in TK-19 suggests high degree weathering of the coal. This ground disturbance could explain the large difference in coal thickness between TK-11 and TK-19.

The Brunner resource in this block is 219,180m^3 and 284,934t. The Paparoa resource in this block is estimated at 77,553m^3 and 100,819t. The Brunner seam resource in Block 3 is considered Indicated status. The Paparoa resource in Block 3 is considered

Inferred status. DOC Stewardship land contains 4% of the Brunner coal resource and 6% of the Paparoa coal resource in Block 3.

4.2.4 Block 4

Block 4 is situated to the west of Block 3. This block is bounded by faults to the east, south and west. The block outcrops to the north.

Block 4 contains three drill holes (TK-2, TK-15 and TK-18) and two outcrop points. TK-2 and TK-15 are historic drill holes. All three drill holes intersected a thick seam of Brunner coal. Both outcrops suggest very minor thickness change across the block. The dip of the sediments is interpreted to steepen to the north and west as a result of structural down warping. TK-18 was stopped shallower than planned due to hole stability problems, however, it ceased in a sequence interpreted as basal Paparoa Coal Measures and intersected rare, very thin (<20cm) horizons of Paparoa coal at depth.

The Brunner seam resource in this block is 561,020m^3 and 729,326t. The resource status of the Brunner seam in Block 4 is considered Measured.

4.2.5 Block 5

Block 5 is the furthest northwest of the current resource blocks. It is fault bounded to the east and south. The seam is interpreted to thin out towards the north and west.

Block 5 contains two drill holes (TK-4 and TK-27) and no outcrop data. The historic TK-4 did not intersect coal and TK-27 intersected a thin seam of Brunner coal. TK-27 was halted in basal Paparoa Coal Measures, with no Paparoa coal intersections.

The Brunner seam resource in this block is 193,130m^3 and 251,069t. The resource status of the Brunner seam in Block 5 is considered Inferred.

4.2.6 Block 6

Block 6 is situated directly south of Block 3 across a faulted boundary with approximately 65m down-throw to the north. This block is entirely fault bounded.

Block 6 contains one drill hole (TK-22) and no outcrop data. TK-22 intersected a thin seam of Paparoa coal at 62.98m depth. Drilling difficulties prevented a confirmed Hawks Crag Breccia intersection.

The Paparoa seam resource in this block is 39,054m^3 and 50,770t. The resource status of the Paparoa seam in Block 6 is considered Indicated. 35% of the coal resource in Block 6 is within DOC Stewardship land.

4.2.7 Block 7

Block 7 is located directed west of Block 6 and directly south of Block 4. The block is interpreted to be entirely fault bounded and down-thrown with respect to Block 6.

Block 7 contains two drill holes (TK-10 and TK-20) and no outcrop data. The historic TK-10 hole intersected a thick seam of Paparoa coal at depth. This main seam exhibited a thin Paparoa rider seam above. TK-20 intersected a shallow, thin seam of Brunner coal and a shallow basement upper contact. Large areas of irregular, blocky and voided topography suggests the presence of mass land movement near the western boundary of Block 7.

It is interpreted that the thick Paparoa seam intersected in TK-10 thins rapidly to the west onto a basement high near TK-20. It is suggested that this basement high extends southwest to a correspondingly high basement upper contact in TK-17 (Block 11). It is also possible a north-south fault splay (identified by LIDAR elevation surface interpretation) bisects coal measures between TK-10 and TK-20. As a consequence Block 7 has been subdivided for modelling purposes into Block 7a and Block 7b (Figure 12).

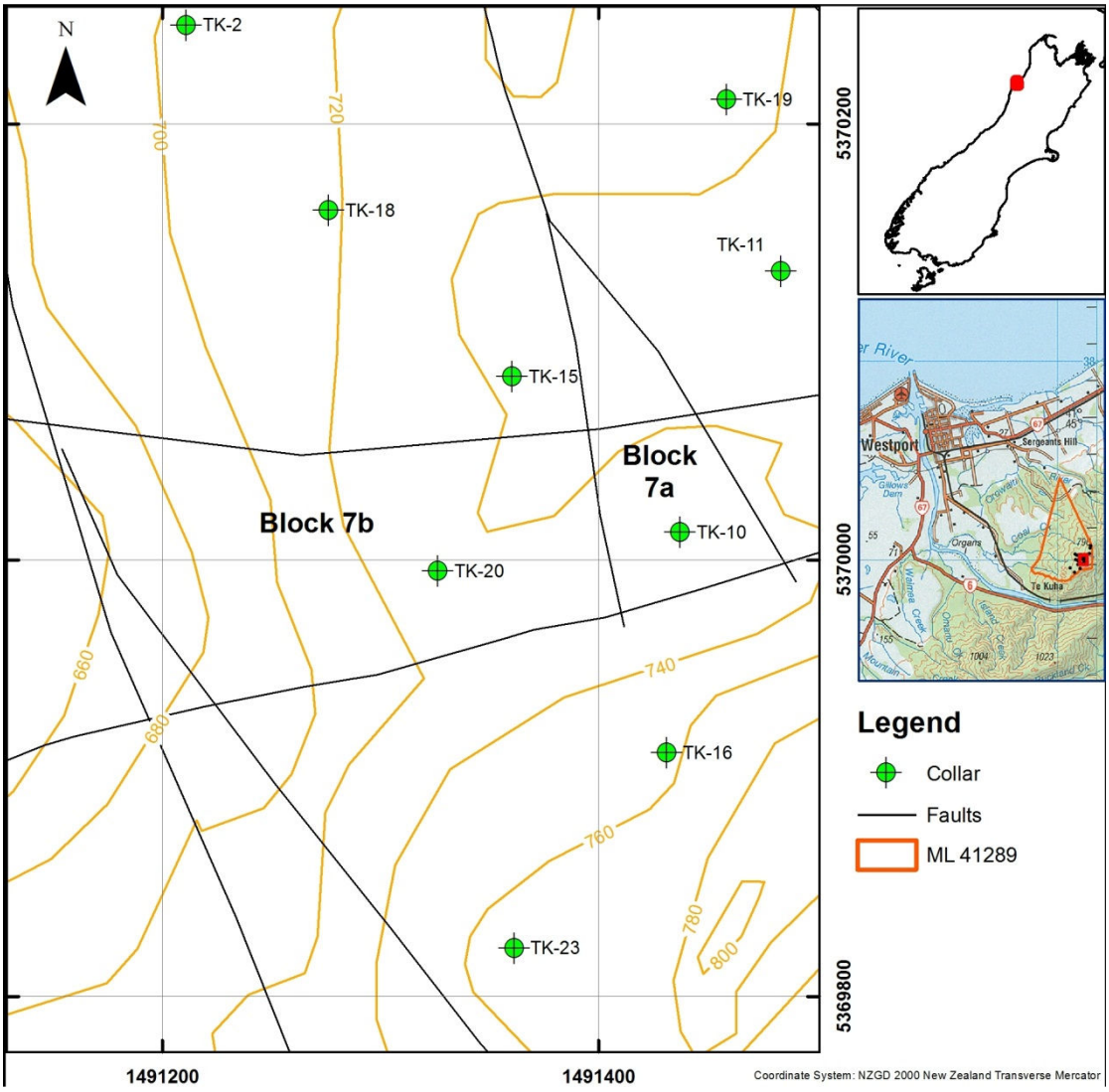

Figure 12: Block 7 Subdivision

The Paparoa resource is 24,215m^3 and 31,480t. The Brunner seam resource is 69,325m^3 and 90,123t. The resource status of the Paparoa resource (including rider seam) in Block 7a is considered Indicated. The resource status of the Brunner seam in Block 7b is considered Indicated.

4.2.8 Block 8

Block 8 is located directly west of Block 7 and south of Block 5. It is fault bounded to the north, east and south. The seam is interpreted to thin out to the west.

Block 8 has three drill holes (TK-1, TK-13 and TK-28) and two excavated outcrops. TK-1 and TK-13 are historic drill holes. TK-1 intersected a shallow, thick Brunner seam with two non-coal partings. TK-28 intersected a similarly shallow, thick seam of Brunner coal but without partings. Both outcrop points exhibit a thick seam of Brunner coal. TK-13 exhibited a thin seam of Brunner coal at depth. These intersections confirm a thinning trend to the north and west as present in Block 5.

Drilling difficulties prevented coring of basement in TK-28, however, it is interpreted that no significant Paparoa seams exist at depth in this block because of thinning trends observed in blocks 10, 11 and 12.

The Brunner seam resource in this block is 142,650m^3 and 185,445t. The resource status for the Brunner seam in Block 8 is considered Indicated.

4.2.9 Block 9

Block 9 is located directly south of blocks 6 and 7. Block 9 is interpreted as fault bounded to the west, north and east. The coal seam outcrops along the southern boundary.

Block 9 contains two drill holes (TK-16 and TK-23) and five outcrop locations. TK-16 is an historic drill hole. All drill holes and outcrops confirm a thick seam of Paparoa coal dipping to the northwest. This thick seam exhibited two thin lower splits in TK-23. The drill holes intersected this seam at depth below the main southern ridgeline in the deposit area. The seam and Paparoa Coal Measures are interpreted to thin rapidly onto a basement high trending from TK-17 (Block 11) to TK-20 (Block 7).

The Paparoa seam resource in Block 9 is 806,920m^3 and 1,048,995t. The resource status for the Paparoa seam (including the lower splits) in Block 9 is considered Measured. DOC Stewardship land contains 62% of the coal resource in Block 9.

4.2.10 Block 10

Block 10 is located directly west of Block 9 and south of Block 7. It is interpreted as fault bounded to the west, north and east with an outcropping southern limit. The fault displacement between Block 10 and both blocks 9 and 11 (to the west) is likely to be minor.

Block 10 contains one drillhole (TK-24) and one outcrop data point. TK-24 intersected a thin, parted seam of Brunner coal <10m below ground surface and intersected 2 thin seams of Paparoa coal at depth. The uppermost of these Paparoa seams exhibits a thin lower split. The outcrop data point recorded a thick Paparoa seam intersection. It is interpreted that the seam thins and splits to the north. The second thin coal intersection is interpreted as a minor seam below the Paparoa main seam. Large areas of irregular, blocky and voided topography suggests the presence of mass land movement in Block 10.

The resource for the Brunner main seam in this block is 5,414m^3 and 7,039t. The resource for the Paparoa coal in this block is 162,256m^3 and 210,932t. The resource status for the Brunner main seam in Block 10 is considered Indicated. The resource status for the Paparoa main seam (including the lower split) and Paparoa thin seam in Block 10 is also considered Indicated. DOC Stewardship Land contains 63% of the Paparoa coal resource and none of the Brunner resource in Block 10.

4.2.11 Block 11

Block 11 is located directly west of Block 10 and south of Block 8. This block is interpreted as fault bounded to the west, north and east with a southern outcrop limit. The seam is interpreted as thinning out to the north and northwest.

Block 11 has three drillholes (TK-12, TK-17 and TK-26) and two outcrop data points. TK-26 intersected a shallow, thick seam of Paparoa coal, incorporating 2 thin (0.25 and 0.8m) rock partings. Both outcrop data points measured thick seam intersections. TK-17 did not intersect any coal and encountered a relatively shallow basement upper contact. The historic TK-12 hole was collared into a thick band of highly carbonaceous mudstone with very thin high ash coal horizons. This was confirmed by recent blast trenching at the collar location. The Paparoa Coal Measures and Paparoa main seam are interpreted as thinning to the north onto a basement high.

The resource for the Paparoa coal in this block is 396,240m^3 and 515,112t. The resource status for the Paparoa coal in Block 11 is considered Indicated. DOC Stewardship land contains 29% of the coal resource in Block 11. DOC Scenic Reserve contains 24% of the coal resource in Block 11. Scenic Reserve is outside Mining Permit 41289 and its extension application.

4.2.12 Block 12

Block 12 is located directly west of Block 11, with which it shares a faulted boundary of minor offset. The block is topographically controlled to the south. The northern and western boundaries of the block are defined by rapid seam thinning to the north and west.

Block 12 contains one drill hole (TK-25) and two outcrop data points. TK-25 did not intersect any coal and encountered a basal sequence at shallow depth. The outcrop data points were only grab samples of thin, highly carbonaceous mudstones, with no trenching. The southern outcrop trace is interpreted from historical maps (O'Brien, 1986; Yardley and Black, 1994).

The resource of coal in this block is 41,381m^3 and 53,795t. The resource status for any coal in Block 12 is considered Inferred. DOC Scenic Reserve land contains 64% of the coal resource in Block 12.

5. Model Data Points

5.1 Faults

There are a number of faults in the Te Kuha prospect (Appendix 1: Fault Data). However, none of these faults have been field measured. All faults have been delineated using historic and current topographic surface features, vegetation traces and discordance in either drillhole and/or outcrop geology.

Faults have been grouped into an orientation based naming system. Approximately East-West trending faults have the prefix "EW". Approximately North-South trending faults have the prefix "NS".

All faults except EW Fault 3 have dependent data types. The dependent data types include surface interpolants (fault planes), domains (as defined by surface interpolants) and veins (as constrained by domains). Historical work has suggested fault orientation in the Te Kuha prospect is likely to be closely related to field measured jointing observations. Surveyed joints in the Te Kuha prospect are all sub-vertical to vertical and are chiefly oriented NE to SW and NW to SE (Western Coal Mining Ltd, 1986).

EW Fault 3 had been historically interpreted as a vertical fault with major offset (Western Coal Mining Ltd, 1986). Re-interpretation using a topographic surface modelled on current LIDAR elevation points now suggests this linear feature is actually a strong planar feature likely to be the bedding contact between the Brunner Coal Measures and the Paparoa Coal Measures. This contact might also be the location of a minor dip-slip fault offset.

5.2 Structural data points

The main structural data points used in the model are bedding (Appendix 2: Structural Data). These bedding points have all been field measured by either historical programs or recent CRL field work. In all cases a number of bedding measurements were taken for each location and the average dip and dip direction (azimuth) was used in the model. Bedding data points from historic work were digitised from the "Geological Interpretation Map" in CR2861 (Yardley and Black, 1994).

These bedding points were used with the drill hole and outcrop geology to infer geological unit extent and trends (coal units and coal measures) in the model. Coal unit data points are discussed in detail in section 5.3

Other structural data points used in the model include basement highs, and lower contacts of the Brunner and Paparoa Coal Measures. A basement high has been identified by drillhole data. This high is interpreted to trend from TK-12 and TK-17 in Block 11 North-East towards TK-20 in Block 7b. All three of these drillholes display a localised shallow upper contact of Hawks Crag Breccia.

The lower contacts of the Brunner Coal Measures and Paparoa Coal Measures can be broadly interpreted in drill hole data and inferred from topographic traces, vegetation traces and bedding orientations.

5.3 Coal data points

Coal data points in the model are either field measured (drill hole or trench/outcrop contacts) or inferred (Appendix 3: Coal Point Data). Coal data points represent the upper contacts (hanging walls), lower contacts (footwalls) or thinning extents of the seams. All thinning extents have been interpreted using available fault data, structural data and field measured geology points. Cut-offs of 0.5m thickness have been inferred from full seam modelling using the vein function of Leapfrog Mining Version 2.5.1.13

The Paparoa seam modelled in a combination of Blocks 1 and 2 required a merge of topographic data. 20m contours were modelled alongside LIDAR elevation points for a merged topographic surface near the eastern limit of the deposit where this seam is interpreted to outcrop. The accuracy of the 20m contours (derived from historic New Zealand topographic data) is far less than the LIDAR generated surface which covers almost all of the deposit.

6. Recommendations for further work

Further work is recommended for the Te Kuha prospect to elevate the resource status for a number of blocks.

The Paparoa seam resource inferred in blocks 1 and 2 relies entirely on historical data. Outcrops ID 008, ID 002 and ID 003 need to be ground truthed and spatial accuracy refined with extra trenches dug at points along the inferred seam outcrop line.

Two deep drill holes are proposed to intercept the Paparoa seam away from the southern outcrop line. These drill holes could be open-hole drilled from existing pads or clear ground. Two positions have been proposed: “Block 1 DH A” and “Block 1 DH B” (Figure 13). These drill holes are outside the current boundaries of Mining Permit 41289. An application has been lodged with New Zealand Petroleum and Minerals to extend the permit into this area. The planned drill holes are sited on DOC Stewardship land.

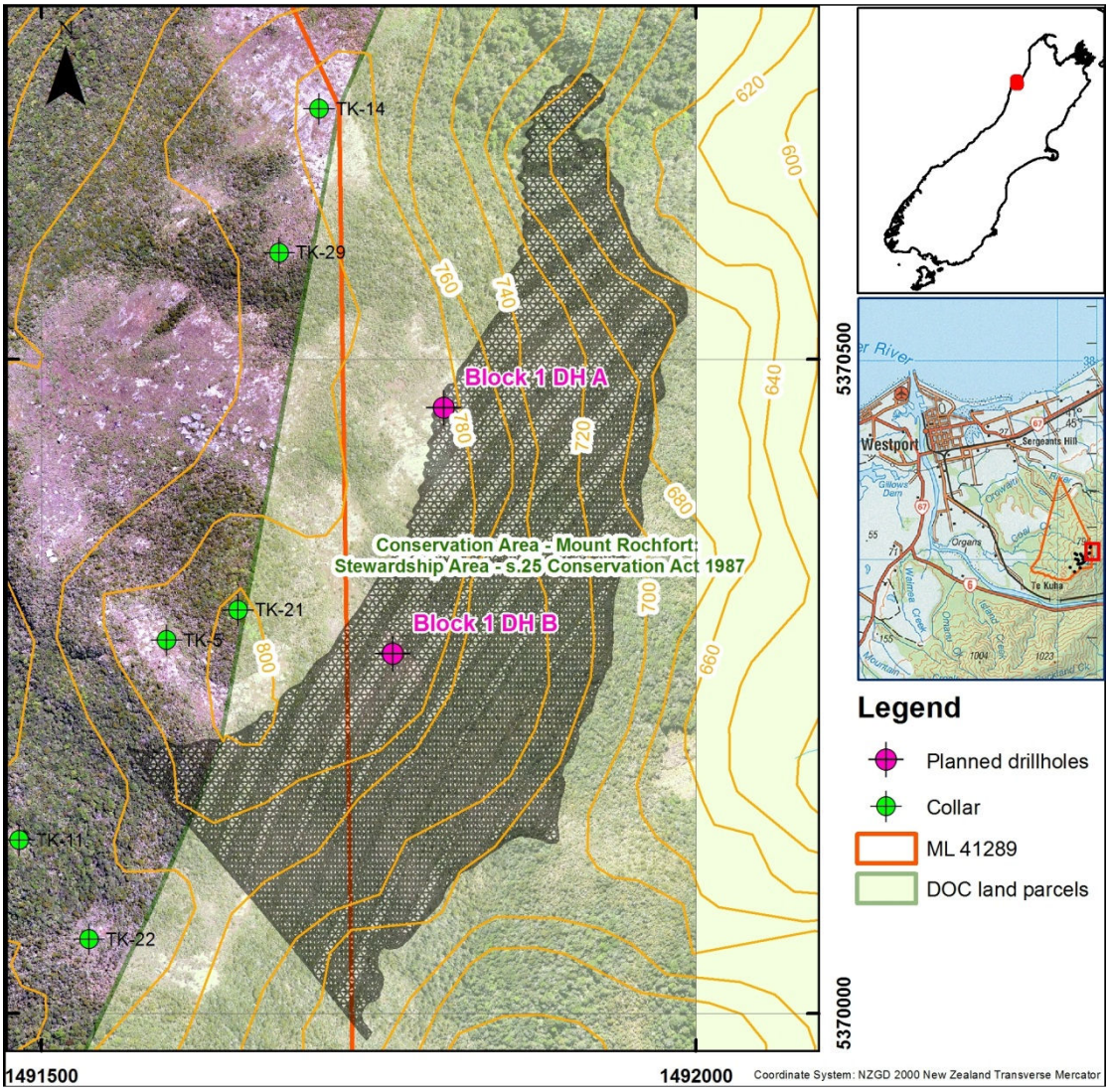

Figure 13: Proposed Drillholes - Block 1

Block 3 requires a drill hole to elevate the resource status. A drill hole is proposed in the north of the block to check the thickness of the Brunner seam and confirm the thinning extent of the Paparoa seams. Location "Block 3 DH C" is proposed (Figure 14).

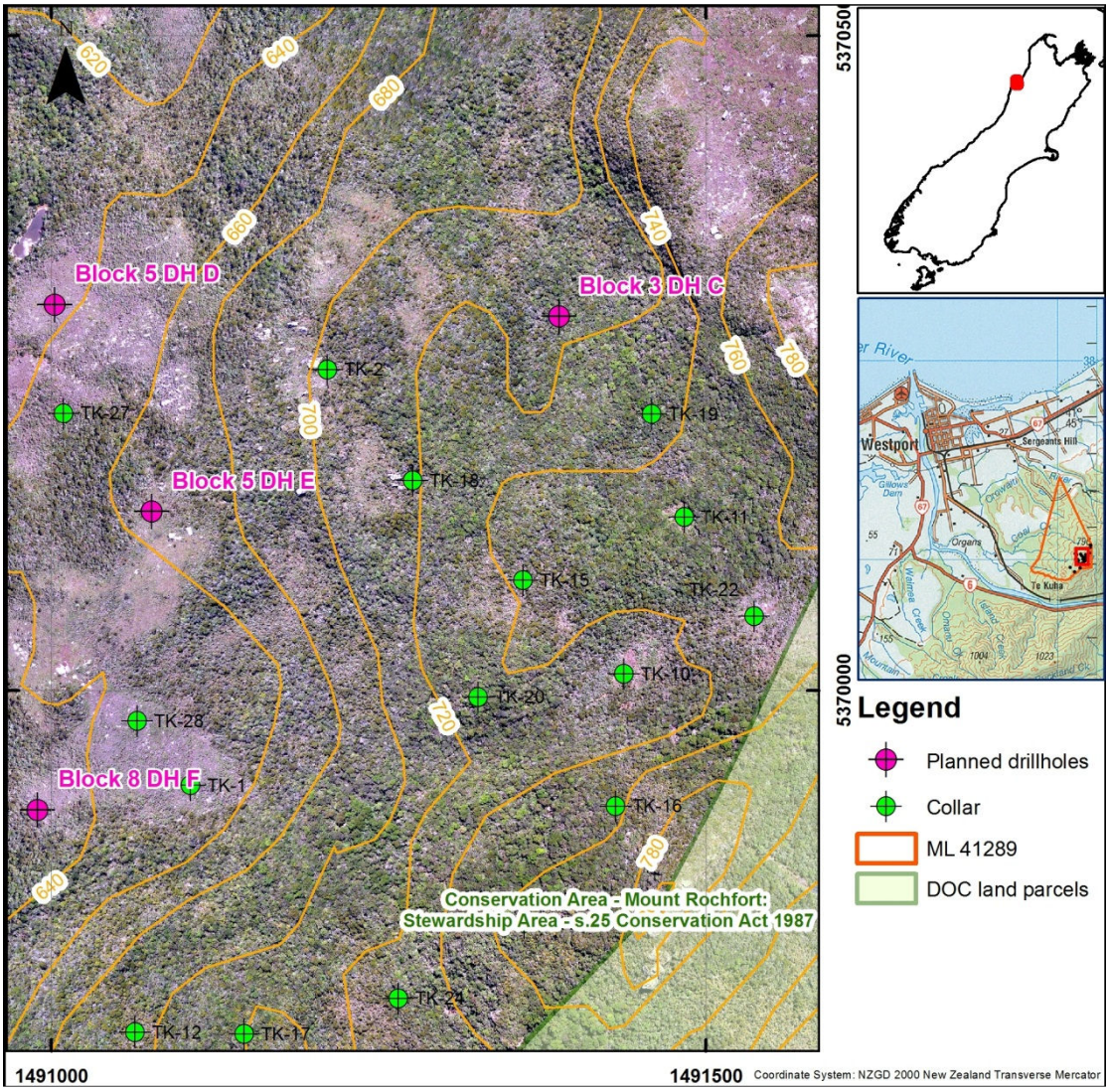

Figure 14: Proposed Drillholes - blocks 3, 5 and 8

Block 5 requires two drill holes to elevate the resource status. Locations "Block 5 DH D" and "Block 5 DH E" are proposed (Figure 14). These holes are to check the thickness and extent of the Brunner seam.

Block 8 requires one more drill hole to elevate resource status. Hole "Block 8 DH F" is proposed in the southwest of the block to check Brunner seam thinning extent (Figure 14).

Block 10 requires one drill hole in the southeast of the block to check Paparoa seam thickness. Location "Block 10 DH G" is proposed. This planned drill hole is sited on DOC Stewardship land (Figure 15).

Block 11 requires two drill holes to elevate resource status (Figure 15). Drill holes "Block 11 DH H" and "Block 11 DH I" are proposed in the east and southwest areas of the block to check Paparoa seam thickness. An extra drill hole "Block 11 DH J" is planned as a "sterilisation" open-hole drill hole to prove there is no coal in the northern section of Block 11.

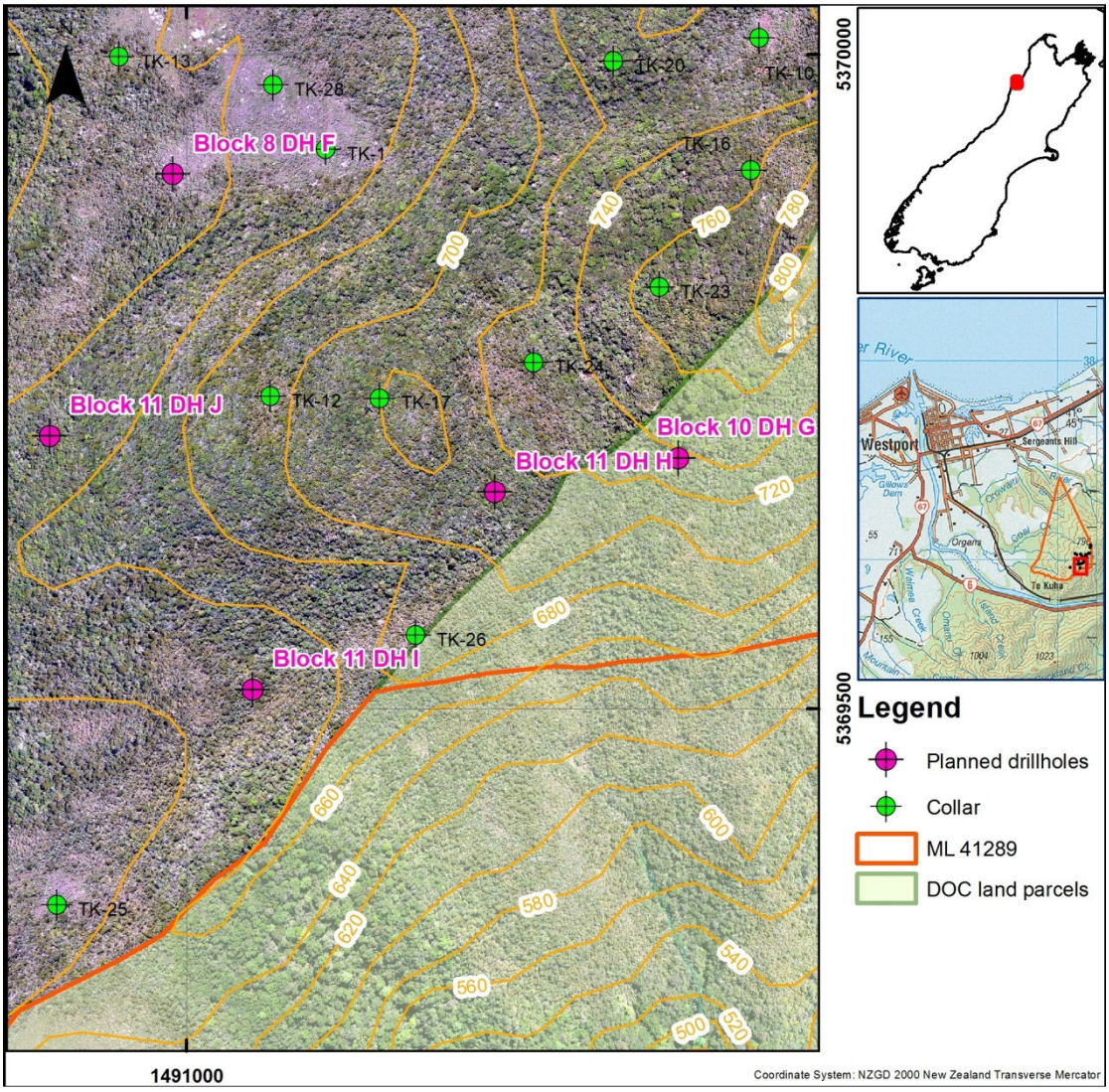

Figure 15: Proposed Drillholes - blocks 10 and 11

In addition to drilling an extra mapping and augering program is proposed for blocks 7 and 12. The western boundary of Block 7 is generally unsuitable for siting a drill hole due to a blocky and voided land surface. It is proposed to auger and/or trench in this area to locate the outcrop line of the Brunner seam in this block. Augering and trenching is also proposed in Block 12 to check the thickness and extent of the Paparoa seam.

The current dataset is sufficient to commence mining engineering studies that are required to identify the part of the geological resource that can be extracted given a particular mining method and scenario and therefore to define mining reserves. Mining reserve calculations require sign off by a qualified and experienced mining engineer. Following and in parallel mining engineering studies, feasibility studies are required for particular markets for the coal product. At this stage bulk samples of coal could be required because economic considerations related to the value of the product will impact the type of mining operations that can be completed.

Additional work related to resource consent should also be considered including but not limited to flora and fauna studies, mine drainage chemistry studies, baseline water studies and more.

7. Summary

The Te Kuha deposit is a complex, fault-intersected, multi-seam deposit. The area is affected by mass land movement in numerous areas.

The total coal resource for the deposit is estimated as 4,400,000 tonnes. The Brunner coal resource for the deposit is estimated as 2,000,000 tonnes. The Paparoa coal resource for the deposit is estimated as 2,400,000 tonnes.

Approximately 4% of the total coal-in-ground resource is within DOC Scenic Reserve land and 34% of the total resource is within DOC Stewardship Area land. The boundaries of Mining Permit 41289 are currently under application to be altered. If permit boundary alterations are approved 96% of the coal resource will be within MP 41289 (i.e. all coal except that inside Scenic Reserve). Currently 90% of the resource is within MP 41289.

Further work such as mapping, augering, trenching and drilling is recommended to elevate the resource status of selected blocks. The land surface is very steep, blocky and voided in areas and therefore any further drill pads may require extensive preparation.

8. References

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Appendix 1: Fault Data

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
EW Fault 1	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
EW Fault 2	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
EW Fault 3	Polyline	N	n/a	Inferred	Topographic trace suggests a linear feature. Historical interpretation (Western Coal Mining Ltd, 1986) of this feature has been a near vertical fault. CRL re-interprets this to be an approximate dip slope contact between Brunner Coal Measures and Paparoa Coal Measures which may have minor offset (i.e. faulted along bedding)
EW Fault 4	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace
EW Fault 5	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace (Western Coal Mining Ltd, 1986)
EW Fault 6	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace (Western Coal Mining Ltd, 1986)
EW Fault 7	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace
EW Fault 8	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace
NS Fault 1	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 2	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 3	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 3a	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 4	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 4a	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 5	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace

NS Fault 6	Polyline	Y	Surface interpolant, domains, veins	Inferred	Discordance in outcrop and/or drillhole geology, topographic trace, vegetation trace
NS Fault 7	Polyline	Y	Surface interpolant	Inferred	Topographic and vegetation trace

Appendix 2: Structural Data

x	y	z	azimuth	dip
1491849.25	5370426.54	772	226	27
1491811.84	5370352.2	787	238	16
1491673.99	5370461.5	769	270	13
1491708.94	5370356.64	784	270	30
1491743.79	5370327.32	784	270	18
1491722.73	5370290.01	788	264	12
1491551.84	5370264.97	777	203	15
1491683.92	5370041.6	739	288	35
1491663.53	5370008.69	745	236	16
1491297.89	5369609.22	683	278	16
1490907.69	5369822.4	629	0	12
1491077.76	5369970.23	648	295	17
1490995.27	5370042.99	639	279	30
1491094.91	5370035.57	649	270	24
1491103.72	5370254.31	667	304	28
1491038.37	5370280.26	648	315	18
1491105.11	5370442.92	631	270	24
1491028.64	5370534.22	610	259	26
1490906.3	5370828.95	521	312	18
1491128.28	5370861.39	565	297	20
1491713.12	5370578.24	777	284	25
1491706.16	5370636.17	780	248	17
1491722.85	5370667.22	789	256	22
1491934.95	5370644.75	670	241	30
1491599.43	5370719.36	755	225	36
1491655.97	5370739.75	761	228	18
1491807.51	5370728.63	747	189	20
1491766.27	5370776.82	768	220	62
1491675.9	5370871.82	726	218	50
1491876.56	5370933.92	758	249	65
1491629.09	5370946.9	705	270	40
1491537.8	5371004.36	677	202	32
1491483.12	5371047.46	660	212	15
1490711.05	5371450.18	424	329	56
1490778.25	5371416.35	452	328	32
1490881.13	5371412.18	478	332	56
1491609.17	5369806.42	694	267	13
1491619.69	5370009.07	763	253	22
1491159.9	5369971.5	659	330	26
1491103.9	5370033.5	647	344	20
1491139.44	5369948.28	658	270	34
1491622.77	5370029.52	767	270	8
1491529.19	5370270.98	763	329	15

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Blocks 11 and 7b Hawks Crag Breccia HW	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Block 8 Brunner Coal Measures Lower Contact	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Block 9 Brunner Coal Measures Subset 1 footwall	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Block 10 Brunner Coal Measures Subset 1 footwall	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Block 11 Brunner Coal Measures Subset 1 footwall	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Block 12 Brunner Coal Measures Subset 1 footwall	Point Data	Y	Merged point data, surface interpolant, domain	Field Measured (Drillhole data)	
Basement High (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised unit thickness trends as observed in drillhole intercepts.
Brunner Coal Measures Lower Contact (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Topographic surface trace, vegetation trace, bedding orientations and drillhole intercepts
Paparoa Coal Measures Lower Contact (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Topographic surface trace, vegetation trace, bedding orientations and drillhole intercepts

Appendix 3: Coal Point Data

Block 1

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 1 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 1 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 1 Brunner Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Field observed coal outcrops, coal float in surface sediments, topographic surface trace and vegetation trace
Block 1 Brunner Main Seam Hanging Wall (INF)	Polyline	N		Inferred	Field observed coal outcrops, coal float in surface sediments, topographic surface trace and vegetation trace
Block 1 Extent Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Field observed absence of coal and coal float on eroded dip slope north and east of this line

Drillholes (3) **TK-14, TK-21, TK-29**
Trenches and/outcrops (6) **ID 001, CR1597 EX3, CR1597 EX4, CR1597 EX2, CR1597 EX1, CRL U2 Ex2**

Blocks 1 and 2 Paparoa Seam

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Blocks 1 and 2 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (historic outcrop data)	
Blocks 1 and 2 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (historic outcrop data)	
Blocks 1 and 2 Extent Paparoa Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Blocks 1 and 2 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (4) **TK-5, TK-14, TK-21, TK-29**
Trenches and/outcrops (3) **ID 008, ID 002, ID 003**

Block 2

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 2 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 2 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 2 Brunner Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Field observed coal outcrops, coal float in surface sediments, topographic surface trace and vegetation trace
Block 2 Brunner Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Field observed coal outcrops, coal float in surface sediments, topographic surface trace and vegetation trace

Drillholes (1) **TK-5**
Trenches and/outcrops (4) **ID 007, CR1597 EX9, DM13-15, CRL U2 EX1**

Block 3

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 3 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Paparoa Seam 1 FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Paparoa Seam 1 HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Paparoa Seam 3 FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Paparoa Seam 3 HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 3 Brunner Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from bounding resource blocks
Block 3 Brunner Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from bounding resource blocks
Block 3 Extent Paparoa Seam 1 (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding trends as observed from structure point data and drillhole intercepts

Block 3 Extent Paparoa Seam 2 (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 3 Extent Paparoa Seam 3 (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 3 0.5m Cutoff Paparoa Seam 1 (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 3 0.5m Cutoff Paparoa Seam 3 (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (2) **TK-11, TK-19**
Trenches and/outcrops (0)

Block 4

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 4 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 4 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	

Drillholes (3) **TK-2, TK-15, TK-18**
Trenches and/outcrops (2) **DM9-11, DM12**

Block 5

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 5 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 5 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 5 Extent Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 5 0.5m Cutoff Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (2) **TK-4, TK-27**
Trenches and/outcrops (0)

Block 6

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 6 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 6 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 6 Paparoa Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 6 Paparoa Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts

Drillholes (1) **TK-22**
Trenches and/outcrops (0)

Block 7

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 7a Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 7a Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 7b Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 7b Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 7a Paparoa Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 7a Paparoa Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 7b Brunner Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 7b Brunner Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 7a Extent Paparoa Thin Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts

Block 7b Extent Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 7a 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 7a 0.5m Cutoff Paparoa Thin Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 7b 0.5m Cutoff Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (2) **TK-10, TK-20**
Trenches and/outcrops (0)

Block 8

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 8 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 8 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 8 Extent Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 8 Parting 1 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	
Block 8 Parting 1 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	
Block 8 Extent Parting 1 Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 8 Parting 2 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	
Block 8 Parting 2 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	

Block 8 Extent Parting 2 Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 8 0.5m Cutoff Brunner Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Inferred from vein modelled thickness gradients
Block 8 Brunner Main Seam Footwall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from drillhole intercepts and bounding resource blocks
Block 8 Brunner Main Seam Hanging Wall (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from drillhole intercepts and bounding resource blocks

Drillholes (3)	**TK-1, TK-13, TK-28**
Trenches and/outcrops (2)	**DM1-3/TKOC 1001-1004, DM4-5**

Block 9

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 9 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Lower Split 1 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Lower Split 1 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Lower Split 2 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Lower Split 2 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 9 Extent Lower Split 1 Paparoa Main Seam	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts

Block 9 Extent Lower Split 2 Paparoa Main Seam	Polyline	Y	Surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 9 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Surface interpolant, domain, vein	Inferred	Inferred from vein modelled thickness gradients

Drillholes (2) **TK-16, TK-23**
Trenches and/outcrops (5) **ID 006, CR1597 EX5, CR1597 EX6, CR1597 EX7, TRM 1A-B**

Block 10

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 10 Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 10 Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 10 Parting Brunner Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	
Block 10 Parting Brunner Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain	Field measured (drillhole data)	
Block 10 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 10 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 10 Paparoa Thin Seam 1 FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 10 Paparoa Thin Seam 1 HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	

Block 10 Paparoa Thin Seam 2 FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 10 Paparoa Thin Seam 2 HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 10 Extent Brunner Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 10 Extent Parting Brunner Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 10 Extent Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 10 Extent Paparoa Thin Seam 1(INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 10 Extent Paparoa Thin Seam 2(INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 10 0.5m Cutoff Brunner Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 10 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 10 0.5m Cutoff Paparoa Thin Seam 1 (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Block 10 0.5m Cutoff Paparoa Thin Seam 2(INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (1) **TK-24**
Trenches and/outcrops (1) **ID 005**

Block 11

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 11 Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 11 Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole and trench/outcrop data)	
Block 11 Upper Parting Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 11 Upper Parting Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 11 Lower Parting Paparoa Main Seam FW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 11 Lower Parting Paparoa Main Seam HW	Point data	Y	Merged point data, surface interpolant, domain, vein	Field measured (drillhole data)	
Block 11 Lower Split Paparoa Main Seam Footwall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Lower Split Paparoa Main Seam Hanging Wall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts

Block 11 Paparoa Thin Seam Footwall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Paparoa Thin Seam Hanging Wall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Upper Parting Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Upper Parting Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Lower Parting Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Lower Parting Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 Extent Lower Split Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts

Block 11 Extent Paparoa Thin Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Localised thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 11 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 11 0.5m Cutoff Lower Split Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients
Block 11 0.5m Cutoff Paparoa Thin Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (3) **TK-12, TK-17, TK-26**
Trenches and/outcrops (2) **ID 004, CR1597 EX8**

Block 12

Data entity name	Data type	Dependents (Y/N)	Dependent generated data types	Field Measured or Inferred	Rationale for inference
Block 12 Paparoa Main Seam Footwall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from bounding resource blocks
Block 12 Paparoa Main Seam Hanging Wall (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Historical maps, structural extrapolation from bounding resource blocks
Block 12 Extent Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain, vein	Inferred	Deposit wide thinning trends as observed from drillhole intercepts, bedding orientations as observed from structure point data and drillhole intercepts
Block 12 0.5m Cutoff Paparoa Main Seam (INF)	Polyline	Y	Merged point data, surface interpolant, domain	Inferred	Inferred from vein modelled thickness gradients

Drillholes (2) **TK-3, TK25**
Trenches and/outcrops (2) **DM6-7, DM8**

Appendix 4: CSV import files for Te Kuha Resource Model

(CSV files are presented on the enclosed CD)