



**Technical Report – Preliminary
Economic Assessment**

Gordon Creek Deposit - Flatbed Coal
Property, British Columbia

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This document, titled "Preliminary Economic Assessment, Technical Report - Gordon Creek Deposit - Flatbed Coal Property, British Columbia" (Gordon Creek PEA Report), has been prepared for Colonial Coal International Corp. (Colonial) (the Client) by Stantec Consulting Services Inc. (Stantec). The Gordon Creek PEA Report has been prepared using the current guidelines of the National Instrument (NI) 43-101 and Form 43-101F1 (Canadian Securities Administrators (CSA), 2011).

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Abbreviations

%	Percent
3D	Three dimensional
adb	Air dried basis
AOA	Archaeological Overview Assessment
ASTM	American Society for Testing and Materials
BC	British Columbia
BCEAO	British Columbia Environmental Assessment Office
Birtley	Birtley Coal and Minerals Testing
CAN \$	Canadian Dollars
CCC	Clean coal composite
CEAA	Canadian Environmental Assessment Agency
CHP	Coal Handling Plant
CHPP	Coal Handling and Preparation Plant
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
Colonial	Colonial Coal International Corp.
Conuma	Conuma Coal Resources Ltd.
CPP	Coal Preparation Plant
CM	Continuous miner
CSA	Canadian Securities Administrators
CSR	Coke strength after reaction
Denison	Denison Mines Limited
DDPM	Dial divisions per minute
Dmmf	Dry mineral matter free
EMPR	Ministry of Energy Mines and Petroleum Resources
Flatbed	Flatbed Coal Property
FOB	Free-on-board
FSI	Free swelling indices
FUP	Free Use Permit
GSC	Geological Survey of Canada
Ha	Hectares
HCC	Hard coking coal
HEWR	High Elevation Winter Range Habitat
HGI	Hardgrove Grindability Index
hp	Horsepower
HQ	Core diameter 63.5mm



IRR	Internal rate of return
Kennecott	Kennecott Canada Exploration Inc.
km	Kilometres
kV	Kilovolt
kW	Kilowatt
LOM	Life-of-mine
Lvb	Low volatile bituminous
m	Metre
M	Million
MD&A	Management's Discussions and Analysis
MIBC	Methyl Isobutyl Carbinol
mm	Millimetre
MPa	Megapascal
Mt	Million tonnes
Mtpa	Million tonnes per annum
MVA	Mega Volt Amp
mvb	Medium volatile bituminous
Norwest Corporation	Norwest
NTS	National Topographic System
NI	National Instrument
NPV	Net present value
O&G	Oil and gas
OGM	Old Growth Management Areas
OLTC	Occupant License to Cut
Pa	Pascal
PCI	Pulverized coal injection
PEA	Preliminary Economic Assessment
PoP	Potential Probability of Presence
PRC	Peace River Coal, Inc.
PFR	Preliminary Field Reconnaissance
Project	Gordon Creek or Gordon Creek Project or Gordon Creek deposit or Gordon Creek area
pt	Per tonne
QP	Qualified Person
RH	Road header
ROM	Run-of-mine
RoMax	Mean maximum vitrinite reflectance
SEDAR®	System for Electronic Document Analysis and Retrieval



SG	Specific gravity
SHCC	Semi-hard coking coal
Stantec	Stantec Consulting Services Inc.
SUP	Special Use Permit
Teck	Teck Resources Ltd.
URW	Ungulate Winter Range
US \$	US Dollars
VM	Volatile matter



Summary

1.0 SUMMARY

1.1 PROJECT SYNOPSIS

Colonial Coal International Corp. (Colonial) is proposing to develop its Gordon Creek Metallurgical Coal Project located approximately 27 kilometres (km) south-southeast of the town of Tumbler Ridge, British Columbia (BC). The project will comprise an underground mining operation with associated surface coal handling and preparation plant and supporting facilities, projected to produce 57.4 million tonnes (Mt) of metallurgical coal over a period of 30 years. The mine is planned to produce a total of 39.3Mt of hard and semi-hard coking coal from the start of production until year 22 and a total of 18.1Mt of pulverized coal injection (PCI) product from year 20 onwards. Off-site infrastructure will include a rail loadout with associated short (1km) rail spur that would join the existing rail line south of Tumbler Ridge, and an 8km, 230 kilovolt (kV) power transmission line.

Overall, initial capital expenditures have been estimated at CAN \$391 million (M) (US \$300M) with a further CAN \$528M (US \$406M) estimated for sustaining capital over the planned mine life. The free-on-board (FOB) port average annual operating cost is estimated at CAN \$105.19 (US \$80.91) per clean coal tonne, inclusive of royalties and mineral taxes.

Based on a projected overall weighted average price for all coal types of CAN \$208.7 (US \$160.5), a financial analysis indicates the project would yield an after tax, internal rate of return (IRR) of 24.4%, with a net present value (NPV) of CAN \$898M (US \$691M), at a discount rate of 7.5%. This analysis further indicates that the “break-even” coal price is less than CAN \$118.43 (US \$91.10), CAN \$125.45 (US \$96.50), and CAN \$134.29 (US \$103.30) per tonne (pt) for discount rates of 5%, 7.5% and 10%, respectively. A coal price of CAN \$155.87pt (US \$119.90pt) is required, for an IRR of 15%.

The exchange rate used in this report is US \$1.00 equals CAN \$1.30.

1.2 INTRODUCTION

The following Technical Report was prepared by Stantec Consulting Services Inc. (Stantec) for Colonial, a mineral exploration and development company with corporate offices in Vancouver, BC, Canada. This Technical Report summarizes the findings of a Preliminary Economic Assessment (PEA) prepared by Stantec and presents estimates of coal resources from the Gordon Creek Project of Colonial's 100% owned Flatbed Coal Property (Flatbed). This Technical Report has been prepared in accordance with National Instrument (NI) 43-101 and Form 43-101F1 (Canadian Securities Administrators (CSA), 2011).

1.3 LOCATION, ACCESS AND TENURE

The Flatbed Property is located in northeastern BC, approximately 645km north-northeast of Vancouver. The centre of the property is situated approximately 27km south-southeast of the town of Tumbler Ridge and 131km west-southwest of the city of Grande Prairie (Alberta).



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Summary

Access into the Gordon Creek Project is provided primarily by Provincial Highway 52 (the Heritage Highway) and an un-paved, all-weather road built by forestry and oil and gas (O&G) companies. The project is located approximately 7km southeast of a rail line which terminates at the Quintette Mine coal washing plant and load-out facility. This rail line joins the CN Rail main line just north of Prince George and provides direct access to the coal export facility at Ridley Island, Prince Rupert, over a total distance of approximately 1,000km.

The Flatbed Property covers a total area of 9,607 hectares (ha) and consists of one contiguous block of eight coal licenses. These licenses are held beneficially for Colonial by BC numbered company, 0735513 B.C. Ltd., which is a wholly-owned subsidiary of Colonial. A royalty of 1.5 percent (%) is payable on all coal production from the property.

1.4 HISTORY

Adjacent to Flatbed are properties that have seen significant historic coking coal exploration, namely, the Duke Mountain (south), Trend (southwest), Quintette - Babcock (west), and Murray River (northwest) properties. The currently idled Trend coal mine which is owned by Peace River Coal Inc. (PRC), a subsidiary of Anglo American PLC, was in production as recently as 2014. Currently, coking coal production in the Tumbler Ridge area is from the Perry Creek, Brule and Willow Creek mines which is owned and operated by Conuma Coal Resources Ltd (Conuma).

At one time, portions of the current Flatbed Property were held by other coal exploration companies; specifically, Denison Mines Limited (Denison) from the early 1970's to mid-1980's (Denison Mines Limited, 1973), and Kennecott Canada Exploration Inc. (Kennecott) between 2007 and 2009 (Kennecott Canada Exploration Inc., 2007).

1.5 GEOLOGY

The Flatbed Coal Property lies within a belt of Mesozoic strata that forms part of the Rocky Mountain Foothills of northeastern BC. The stratigraphy of this succession broadly represents an alternating sequence of marine shales, as well as marine and non-marine clastic lithologies deposited from a series of transgressive and regressive cycles. The structural geology of the area is dominated by a series of folds and thrust faults typical of Canadian Rocky Mountain Foothills structures.

The coal seams of greatest potential are found within Lower Cretaceous strata of the Gates Formation. Within the Gordon Creek deposit, the Gates Formation contains eight main coal seams, in ascending order they are K, J, G, F2, F1, E, D, and B.

1.6 EXPLORATION

Although portions of the current Flatbed Property were previously held by other mining companies, apart from some limited geological mapping along Gordon Creek, no other previous coal exploration occurred on the property before 2017. Significant O&G exploration has taken place in this region over the past 40 years, and there are currently four O&G wells and numerous seismic lines within the property. Exploration conducted by Colonial in 2017 focused on the Gordon Creek area and consisted of five HQ core holes (2,831.84 metres [m]) and detailed geological mapping along the creek. Additional, historical information was also provided by two O&G wells located within the Gordon Creek area.



Summary

1.7 MINERAL RESOURCES

In January 2018, Norwest Corporation (Norwest) prepared a Technical Report entitled “Flatbed Coal Project, Gordon Creek Area” that presented a geological interpretation, estimated coal resources, provided a coal resource classification and outlined coal quality for the Gordon Creek area. For the January 2018 report, Norwest conducted a review of data collection procedures, data validation, geological interpretation, formatting and treatment of data to support geological model development. This work provided the basis for Norwest’s independent coal resource estimate and coal resource classification for the Gordon Creek area. As no subsequent exploration has been conducted by Colonial on the Flatbed Property, no further re-estimations of coal resources, coal resource classifications, or coal quality have been undertaken; those estimates reported in Norwest’s January 2018 Technical Report are repeated herein.

For this PEA, Stantec has prepared a scoping-level mining study and economic analysis based on the geological data gathered to date. In addition to the mining study and economic analysis, the section on environment studies, permitting and social/community impacts (Section 20) has been reviewed and updated from the January 2018 report. The term ‘mineable’ is used in the mining study to define resources to which mine plans have been applied, but economics have not been considered to a level of accuracy sufficient to define reserves.

Coal resource estimates as reported from the grid model for the Gordon Creek area are summarized in Table 1.1. Resources are estimated for underground deposit types only using a 1.0m minimum seam thickness, and depth of cover limit of 900m. **The effective date of the resource estimate is November 12, 2018.**

Table 1.1 Coal Resources Gordon Creek Area - Flatbed Property

Seam ID	Formation	Classification	Resource (Mt)
B	Gates	Inferred	52.2
D	Gates	Inferred	36.6
E	Gates	Inferred	19.1
F1	Gates	Inferred	21.0
F2	Gates	Inferred	49.2
G	Gates	Inferred	34.8
J	Gates	Inferred	54.2
K	Gates	Inferred	30.9
Total		Inferred	298.0

The resource estimates were prepared in accordance with the requirements of National Instrument (NI) 43-101, Standards of Disclosure for Mineral Projects (Canadian Securities Administrators, 2011). The Geological Survey of Canada (GSC) Paper 88-21 “A Standardized Coal Resource/Reserve Reporting System for Canada” (Hughes, et al, GSC Paper 88-21, 1989) has been referred to for the classification, estimation, and reporting of coal resources. GSC Paper 88-21 was written in 1988 and is now obsolete with respect to certain technical parameters. This document has been used only as a guideline for resource estimation.



Summary

1.8 COAL QUALITY

Analytical results indicate that of the eight Gates coal seams present within the Gordon Creek area; six are coking coals that would yield coking coal products after beneficiation in a wash plant at an 8% to 9% ash air dried basis (adb) product range, while two could provide semi-soft coking coals, and are considered to be best placed to provide PCI product coals. Dry mineral matter free (dmmf) volatile contents indicate that the seams range in rank from low volatile bituminous (lvb) to medium volatile bituminous (mvb), according to American Society for Testing and Materials (ASTM) Standards coal rank classification. Raw seam ash values range from approximately 14.98% to 33.48% (adb), with most of the raw coal seam ash values below 25% (adb). Raw seam total sulphur contents range from 0.32% to 1.44% (adb). All seams but one, Seam E, returned results of less than 1.0%; however, Seam E is not currently considered for mining due to mine layout restrictions in the proposed mine plan.

After crushing to pass 9.5 millimeter (mm), size analysis indicates that between 95.89% and 98.31% of the coal reports to the coarse (9.5mm x 0.25mm) fraction. Float-sink analysis indicates that washing to approximately an 8% to 9% ash product (adb) is possible. From the coarse fraction floats, estimated clean coal free swelling indices (FSI) range between 4.0 and 8.0. Associated laboratory-determined theoretical yields (adjusted for core loss) for the coarse fraction range between 58.3% and 83.2%.

Clean coal composite (CCC) samples using both floats and froths from each seam, targeting ash contents in the 8% to 9% (adb) range, typically clean to a low sulphur product, with sulphur contents ranging between 0.37% and 1.32%. Seven of the eight seams report less than 1% sulphur, the exception being Seam E at 1.32%. The phosphorus-in-coal contents for all CCCs range from 0.002% to 0.089%. FSI values range from 3.5 to 8.5, although the majority are equal to or greater than 6. Maximum fluidity values range between 1 to 1,162 dial divisions per minute (ddpm) and dilatation ranges from negative 13 to positive 122. CCC base/acid ratios range from 0.08 to 0.23, although most are less than 0.13. Mean maximum vitrinite reflectance (RoMax) values range from 1.17 to 1.43.

1.9 MINING METHODS

The resources identified within a multiple seam complex are of sufficient quantity, reasonable depth, and distribution to be amenable to extraction using underground longwall mining techniques. A PEA-level mine plan is presented that examines the economics of this mining approach.

Longwall mining for the Gordon Creek Project was identified as the most productive of the mining methods and would facilitate the highest level of resource recovery to provide favorable economics. A conceptual mine plan proposes the longwall operations be accessed through a shaft/slope combination to the uppermost seam, then progress to the lower seams by slope extensions and inter-seam raise shafts.

It is proposed that the run-of-mine (ROM) coal be sized and washed in a Coal Preparation Plant (CPP) located on site. The clean coal would then be stockpiled for truck transportation over a distance of approximately 17km to a rail loadout stockpile for train transportation to port facilities.



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Summary

Underground production begins in Year 1 with continuous miner (CM) and road header (RH) development in Seam B. The first longwall panel would be ready for production late in Year 2. Production of ROM coal feed to the CPP averages 3.60 million tonnes per annum (Mtpa) with clean coal averaging 1.85Mtpa.

1.10 ENVIRONMENTAL AND PERMITTING

This project is in the early stages of exploration, so an environmental baseline has yet to be developed and executed for the project site. As exploration activity becomes more developed, baseline information gathering will focus on surface hydrology and water quality, groundwater (water quality and levels), geochemical characterization, sediment quality, aquatic resources (benthic invertebrates, periphyton), metals concentrations in tissue (fish and benthic invertebrates), fish and fish habitat, soils, vegetation, wildlife, air quality and noise. Such data are used to document the environmental baseline, complete an environmental effects assessment, and perform modeling to support future permit applications.

The project site is covered by Caribou High Elevation Winter Range Habitat (HEWR) which is bordered, to the east, by Caribou Low Elevation Winter Range Habitat. To provide guidance to Colonial's employees and sub-contractors, during exploration activities, Colonial has developed the Flatbed Caribou Mitigation and Monitoring Plan (Turney, 2017) to ensure that impacts to caribou habitat and caribou populations within the Flatbed Property are minimized.

1.11 MARKETS

All coal seams identified in the Gordon Creek Project resource estimates can be classified as metallurgical coals suitable for the export market. Gordon Creek Seams B, D, (Zone) F and G encompass mid vol coking coals (20-25% VM adb) which vary considerably with regard to rheology, ash content and petrography. Gordon Creek coking coal can be benchmarked against comparable coals from Australia and Canada.

The estimated long-term pricing for Gordon Creek Project coking coal, after applying penalties for ash, sulphur and phosphorus are expected to range from a minimum of CAN \$185 pt (US \$142pt) from Seam B to CAN \$250pt (US \$192pt) from Seam G.

Seams J and K are suitable as a PCI product due to their low volatile content with low ash, low sulphur, low phosphorus and high carbon content. The high carbon (on a dry, ash free basis) is expected to result in Coke Replacement Ratios (CRR) that are comparable to those of the premium low vol PCI coals from Queensland and northeastern BC.

The estimated long-term pricing for PCI coal from both Seams J and K is expected to range from a minimum of CAN \$168pt (US \$129pt) to CAN \$198pt (US \$152pt), after applying penalties for ash, sulphur and phosphorus.

The most significant long-term risk to metallurgical coal pricing lies in a possible global economic slowdown, fueled by of the fear of burgeoning trade wars.

1.12 PROJECT ECONOMICS

The proposed underground mine is expected to begin production in the fourth year of mine operations, producing a total of 111.6Mt ROM and 57.4Mt clean coal with an overall yield of 51% and mine life of 30 years.



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The pre-production capital cost of the underground mine is taken as the total capital required to achieve initial coal production by the end of Year 1 and is estimated at CAN \$391M (US\$300M). An additional CAN \$528M (US\$406M) has been estimated for sustaining capital to replace and add equipment (principally underground mining equipment) and facilities necessary to sustain production over the planned mine life.

Operating costs for underground mining are outlined in Table 1.2 below.

Table 1.2 Operating Costs, Underground

Description	Operating Cost (CAN \$ per ROM tonne)
Drilling and Ground Control	3.41
Operating Supplies	1.41
Repair and Maintenance	2.63
Fuel and Lubrication	0.14
Contracted Services	0.08
Utilities	1.00
Labour	12.24
Total	20.91

Capital costs for the surface operation facilities and infrastructure are estimated at CAN \$187.5M (US\$144.2M) and summarized in Table 1.3 below.

Table 1.3 Facilities Infrastructure Capital Requirements

Description	CAPEX (CAN \$000's)
Construction/Site Prep	\$22,955
Power	\$12,578
Water/Other Utilities	\$3,774
Mine Structures/Buildings	\$15,000
ROM Coal Handling/Storage	\$12,000
Coal Preparation Plant	\$65,000
Refuse Handling	\$13,968
Clean Coal Handling/Storage	\$9,312
Rail Access/Loadout Loop	\$16,560
Rail Loadout and Coal Handling	\$16,400
Total	\$187,548



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The combined facilities, plant, trucking, and rail loadout operating costs have been estimated at approximately CAN \$9.11 (US\$7.00) per clean tonne.

Off-site costs include trucking from the plant site to the rail load out, rail transport, rail loadout to port (Ridley terminal), and port charges have been estimated at approximately CAN \$33.05 (US\$25.42) per clean tonne over the life-of-mine (LOM).

Taking into account coal pricing, off-site costs (port charges, rail transport, etc.) and indirect costs such as taxes, depreciation and royalties, a cash flow was generated on which the NPV was based. The NPV results are summarized in Tables 1.4 and 1.5.

Table 1.4 Economic Analyses Results in Canadian Dollars (M)

Coal Price CAN \$/t	NPV (CAN \$M) at Varying Discount Rates with IRR			
	5%	7.5%	10%	IRR (%)
188.71	\$1,104	\$689	\$429	21.3%
208.71	\$1,405	\$898	\$579	24.4%
228.71	\$1,706	\$1,106	\$729	27.2%

Table 1.5 Economic Analyses Results in US Dollars (M)

Coal Price US\$/t	NPV (US\$M) at Varying Discount Rates with IRR			
	5%	7.5%	10%	IRR (%)
145.16	\$849	\$530	\$330	21.3%
160.54	\$1,081	\$691	\$446	24.4%
175.93	\$1,312	\$851	\$561	27.2%

This PEA is preliminary in nature and includes Inferred mineral resources. Inferred mineral resources are considered too speculative geologically to have technical and economic considerations applied to them that would enable them to be categorized as mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

1.13 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the Gordon Creek area of the Flatbed Property contains a substantial in-situ Inferred coal resource of 298Mt that includes economically mineable metallurgical coal servicing both coking and PCI markets. To further advance the project, additional coal exploration on the property is required to increase the resource confidence to higher classification levels from the current Inferred level.

It is expected that such work would include 2D seismic surveys, designed to identify coal seams and geological structures at relatively shallow depths, in addition to more drilling. It is further recommended that exploration be initiated on a second target located in the eastern portion of the property, which should include an initial 2D seismic survey and detailed geological mapping. The cost for the above recommended work is estimated to be CAN \$2.6M.



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Further mining studies would be initiated subsequent to the proposed exploration program for the ultimate purpose of reporting coal reserves. The costs and scope of these mining studies is dependent on the results of the exploration program.

The accuracy of resource estimates is, in part, a function of the quality and quantity of available data and of engineering and geological interpretation and judgment. Given the data available at the time this report was prepared, the estimates presented herein are considered reasonable. However, they should be accepted with the understanding that additional data and analysis available subsequent to the date of the estimates may necessitate revision. These revisions may be material. There is no guarantee that all or any part of the estimated resources will be recoverable.

Mineral resources are not mineral reserves and there is no assurance that any mineral resources will ultimately be reclassified as proven or probable reserves. Mineral resources which are not mineral reserves do not have demonstrated economic viability.



TECHNICAL REPORT PRELIMINARY ECONOMIC ASSESSMENT FOR THE GORDON CREEK DEPOSIT - FLATBED COAL PROPERTY, BRITISH COLUMBIA

Introduction

2.0 INTRODUCTION

This report has been prepared for Colonial by Stantec and focuses on the Gordon Creek deposit of the Flatbed Coal Property. Colonial owns a block of coal licenses in northeastern BC, collectively referred to as the Flatbed Coal Property (Flatbed). This Technical Report summarizes the findings of a PEA prepared in late 2018 by Stantec and represents estimates of coal resources from the Gordon Creek deposit that were originally reported in a Technical Report prepared by Norwest in January 2018. As no further exploration has been conducted by Colonial on the Flatbed Property since the preparation of the January 2018 Technical Report, no further re-estimations of coal resources, coal resource classifications, or reviews of coal quality have been undertaken; those estimates reported in the January 2018 Technical Report are repeated herein. This Technical Report, summarizing the findings of the Gordon Creek Project PEA, has been prepared in accordance with National Instrument (NI) 43-101, Form 43-101F1 (CSA, 2011). Mr. Derek Loveday, P. Geo is the Stantec Qualified Person (QP).

For the January 2018 Technical Report, Mr. Loveday (who was at the time an employee of Norwest) undertook a review of Colonial's work within the project area, including data obtained and interpretations generated by Colonial, and took responsibility for the report. Verification of the geology and coal development was completed through a site visit and data review. In addition, Norwest constructed a geologic gridded seam model for the project area using validated data provided by Colonial and completed an independent resource estimate for Flatbed's Gordon Creek deposit.

Subsequent to completion of the geologic model and resource estimate, Stantec developed a PEA of the project. This assessment involved the application of preliminary mine planning on a resource base consisting of Inferred geologic resources. The mine planning, cost estimates and economic analysis were based on a conceptual study only.

The purpose of this report is to summarize the findings regarding the preliminary mine planning and associated economic analysis appropriate for a PEA-level evaluation, based upon the coal resources contained within the Gordon Creek deposit of the Flatbed Coal Property. This report is prepared in a manner consistent with Canadian Securities Commission requirements as laid out in NI 43-101 (op. cit.), by personnel who have substantial experience with the coal deposits of western Canada, and northeast BC in particular.

The report repeats the estimation and classification of coal resources for the Gordon Creek area originally reported within the January 2018 Technical Report. Resource estimations were based on Colonial's geologic database for the property which has been generated from their 2017 drilling program plus past work carried out by O&G companies on two O&G tenures that are located within the exploration area. Potentially mineable resource estimates are based on a 2018 Stantec PEA analysis utilizing data from preliminary mine plans. The preliminary mine plans were constructed by Stantec using the geological models prepared for coal resource estimates.

To prepare this report, the author has relied on data collected by others and on exploration data collected by Colonial in 2017. A full set of references is presented in Section 27. However, of these, the following were relied upon to provide most of the historical material reviewed for this study:



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Introduction

Flatbed Coal Project Technical Report, Gordon Creek Area, for Colonial Coal Corporation, Loveday D.J., Norwest Corporation; January 2018.

A site visit, for the purposes of the January 2018 Norwest Technical Report (Norwest, 2018a) was undertaken by the author between October 10, and October 13, 2017. The site visit consisted of a helicopter flight over the entire property including a fly-over of the 2017 drillhole locations plus ground observations of drillhole locations. Also, while on site, Mr. Loveday confirmed previously completed geological mapping along Gordon Creek to verify regional strike and overburden formations. Mr. Loveday also viewed coal seam intervals in core boxes and reviewed core handling, logging, and sampling procedures with Colonial field staff. Subsequent to the above site inspections, the author has observed public records of recent aerial photographs and land development activities, including O&G exploration. Observations of these public records have not identified any material change in the physical environment of the property that would represent a material change from those observations undertaken by the author in 2017.

Norwest submitted the Technical Report entitled *Flatbed Project Technical Report, Gordon Creek Area*, dated January 10, 2018, reporting NI 43-101-compliant resources. Sections from this report have been excerpted in whole or in part for this report; particularly, in the narrative relating to the regional and site geology, site history and property location, coal testing and coal quality and resource estimations for each of the coal seams.

The accuracy of resource and reserve estimates is, in part, a function of the quality and quantity of available data and of engineering and geological interpretation and judgment. Given the data available at the time this report was prepared, the estimates presented herein are considered reasonable. However, they should be accepted with the understanding that additional data and analysis available subsequent to the effective date of the report may necessitate revision of the estimates. These revisions may be material. There is no guarantee that all or any part of the estimated resources will be recoverable.



Reliance on Other Experts

3.0 RELIANCE ON OTHER EXPERTS

This report has been prepared for Colonial, and the findings and conclusions are based on data provided by Colonial in addition to site visits and reports prepared by Norwest (2018a) and others. Norwest Corporation (Norwest) was purchased by Stantec in May of 2018.

Stantec has relied wholly upon information, both private (provided by Colonial) and publicly available, as the basis for classification and reporting of coal resources for the property. Stantec has reviewed these data for completeness. While Stantec believes the data are accurate we cannot, in all circumstances, guarantee that they are reliable.

Stantec relied upon the findings of an independent study on market pricing and contracts (*Price Assessment for Flatbed Metallurgical Coal*, Kobie Koornhof Associates Inc., November 2018 (Koornhof, 2018)), as summarized in Section 19. Coal pricing projections were drawn directly from this study and used in the preliminary economic analysis described in Section 22.

Stantec was provided a summary of environmental studies as summarized by Sage Resource Consultants Ltd. in their report (*Flatbed Coal Project, Environmental Studies, Permitting and Social or Community Impact Overview*, October 2018 (Tate, 2018)). Stantec relied upon the conclusions of that work in presenting the status of environmental permitting, as covered in Section 20 of this report.



4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 LOCATION

The Flatbed Coal Property is situated within the eastern foothills (Inner Foothills Belt) of the Rocky Mountains of northeastern BC, within the Peace River Regional District. The property lies within the Liard Mining Division and is located on National Topographic System (NTS) Map Sheet 93-I/15. It is situated approximately 27km south-southeast of the town of Tumbler Ridge and is centred on UTM NAD83 Zone 10 coordinates 641,270m E and 6,087,398m N. The general location of the property is shown in Figure 4.1 (Section 28, Illustrations), which contains all figures and illustrations of this report.

The property is located within the Peace River Coalfield, in an area well known for producing metallurgical grade coal, ranging from hard coking coal (HCC) to coal for PCI, from predominantly surface mining operations. The currently idled Trend coal mine, owned by PRC, a subsidiary of Anglo American PLC, and the Babcock Mountain deposit, that hosts the proposed Window Pit, owned by Teck Resources Ltd. (Teck), adjoin the Flatbed Property to the southwest and west, respectively. The regional setting of the property, with respect to population centres, roads, rail lines, coal mines, and other major coal deposits is shown in Figure 4.2 (Section 28, Illustrations). A localized project location map illustrating the location of the property in relation to the neighboring Trend Mine and Teck's proposed Window Pit is presented in Figure 4.3 (Section 28, Illustrations).

4.2 COAL LICENSES

The Flatbed Coal Property consists of one contiguous block of 8 coal licenses covering 9,607ha located to cover a northwest-southeast-trending sedimentary succession that hosts prospective coal measures at depth. The recorded owner of the licenses is BC numbered company 0735513 B.C. Ltd., which is a wholly-owned subsidiary of Colonial.

The property lies within the Liard Mining Division and is covered by NTS Map Sheet 93-I/15. Coal license data and descriptions are summarized in Table 4.1 and the locations of the licenses are shown in Figure 4.4 (Section 28, Illustrations). Information pertaining to coal license tenure is posted on the BC Ministry of Energy and Mines web site. The posted records of the BC Ministry of Energy and Mines indicate that the coal licenses are in good standing.



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Property Description and Location

Table 4.1 Coal License Information - Flatbed Coal Property

Tenure Number	Tenure Type	Area (ha)	Current Owner	Issue Date	Good To Date
418547	License	1,340	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418548	License	1,190	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418549	License	1,189	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418550	License	1,488	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418551	License	1,339	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418552	License	1,340	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418553	License	1,191	0735513 B.C. Ltd.	2014/Jun/09	2019/Jun/09
418913	License	530	0735513 B.C. Ltd.	2016/Sep/08	2019/Sep/08
Totals		9,607			

No legal surveys have been undertaken either as a requirement for, or subsequent to acquisition of, the coal licenses. Within BC, coal lands are acquired simply by application (paper “staking”); claim posts are not required. Colonial does not own surface rights over any of the property; there is no requirement to own surface rights to conduct mineral exploration within the Province. No search of land title, survey records, or surface rights has been undertaken for this report. However, it may reasonably be expected that the Crown retains surface rights over most of the property.

O&G exploration and development has been carried out across the region over the past several decades, and several wells have been drilled within and surrounding the Flatbed Property. Most of these wells are situated along the property’s eastern boundary, although four are located within the property itself. One well site is situated just inside the northern boundary of the Gordon Creek area while a second lies just outside this area; both are located on coal license 418,549. Two other well sites are present near the eastern boundary of the property, on coal licenses 418,553 and 418,912. The status of each well has not been determined; however, field observations indicate that none of the wells on the property are producing. A number of retired forest harvest licenses are located within the property but, currently, there are no active or pending licenses. Other tenures or tenure applications that might be present could include un-drilled O&G, forestry, wind farm, guide outfitting, and trapping tenures plus tenure applications.

Under the Coal Act of British Columbia, a licensee has the exclusive rights to explore for and develop coal on the license and, with the approval of the Chief Inspector of Mines, to mine and remove those quantities of coal that may reasonably be required for testing, to a maximum of 100,000 tonnes. The holder of a license is entitled to enter, occupy and use the surface of the location for exploring and developing coal and, subject to obtaining a free use permit or a license to cut under the Forest Act to use and remove timber that is on the location. Further, a licensee has the non-exclusive right to use sand, gravel and rock from the location, for use on the location for a construction purpose approved under the Mines Act, without the necessity of obtaining under the Land Act a license, lease, permit or other authorization.

A coal license is valid for a term of one year from the date of its issue and, subject to complying with the provisions of the license and the Coal Act, the coal license can be extended for further one-year terms on application by the licensee. Such application must be made before the license expires (although a 30-day grace period is available) and must be accompanied by a rental fee and certain information or data respecting the exploration, development and



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Property Description and Location

production of coal. Coal licenses will expire if renewal applications are not made in accordance with the provisions set out above. In addition, the government may suspend operations, refuse to renew a coal license, or terminate a coal license for failure to comply with the Coal Act, the license, the Mines Act or a permit under it. A restriction on the use of surface rights may be imposed by the BC government if the surface area is so situated that it should be used for purposes other than mining. Lands may also be expropriated under the Park Act (BC).

The only financial obligation required on the part of the licensee to keep the coal licenses in good standing are the yearly renewal fees. For the first 5 years these are set at \$7/ha. This increases to \$10/ha for the second 5-year term and by an additional \$5/ha at the end of each 5-year period beginning with the 11th year. There is no financial or other obligation required from Colonial to retain the property. The annual rental fees (for 2018 – 2019), paid to the Crown, to keep the coal licenses in good standing totaled \$67,249.00.

Occasional areas of merchantable timber may be present at lower elevations and a number of logged areas are present both on, and in the general vicinity of, the property. Apart from those areas that have been the focus of O&G and forestry activities, current land use appears limited to hunting, trapping, and recreational activities such as snowmobiling and driving ATVs. The property lies within an active guide-outfitter area and hosts active trap-lines.

As far as can be reasonably ascertained, the property appears to be free of any environmental liabilities associated with previous mineral exploration activities. Disturbances associated with previous O&G drilling and logging operations would have been reclaimed according to the regulations that govern such activities. No mining has been undertaken within any of the licenses, consequently, there are no tailings ponds or waste dumps. Colonial has advised Stantec that reclamation was carried out on all drill sites during the 2017 exploration program. Stantec has not revisited the site to verify the reclamation.

Colonial was issued Mineral & Coal Exploration Activities & Reclamation Permit CX-9-061 on August 14th, 2014; this permit expires December 31st, 2018. The permit authorizes Colonial to perform drilling and access trail construction on coal licenses 418547 through 418551 and 418553.

Colonial was issued an amendment to Mineral & Coal Exploration Activities & Reclamation Permit CX-9-061 on January 16th, 2018; this permit amendment expires December 31st, 2019. The permit amendment authorizes Colonial to perform seismic surveys on coal licenses 418547 through 418553. During 2018, Colonial submitted a request for both the permit and permit amendment to be extended until December 31, 2021.

4.3 OWNERSHIP

The property is held beneficially for Colonial by a BC numbered company, 0735513 B.C. Ltd. This company is a wholly-owned subsidiary of Colonial.

Coal licenses 418547 to 418553 were issued on June 9, 2014, while coal license 418913 was issued on September 8, 2016.

The coal licenses are subject to a 1.5% production royalty, payable on all coal produced, to private stakeholders in the project, including certain directors of Colonial. Disclosure of this royalty is provided in Colonial's past and current initial TSX-V listing documents and is continually disclosed in all of Colonial's quarterly Management's Discussion



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and Analysis (MD&A) filings on SEDAR® (System for Electronic Document Analysis and Retrieval) and in the company's year-end reports.



5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Flatbed Property can be accessed by a network of provincial paved highways and un-paved, all-weather roads plus other trails built by forestry, O&G and coal mining companies. The main access to all portions of the property from Tumbler Ridge is via Highway 52 (Heritage Highway) which is a paved secondary road.

Approximately 20km south-southeast of Tumbler Ridge, Highway 52 intersects the Core Lodge Road, an all-weather road originally constructed to access O&G wells on and around the southeastern and western flanks of Babcock Mountain. For a long period, until completion of a dedicated mine haulage road (the Trend Bypass Road), this road provided the main access route to the Trend coal mine, the entrance to which is approximately 14km southwest of its intersection with Highway 52. A second all-weather O&G access road extends from the mine gate to a shut-in well located atop Quintette Mountain, 7.2km to the southeast. The northern portion of this road has been incorporated into the Trend mine's internal access infrastructure. Some 6km from the mine gate, the Quintette Mountain road passes within 70m of the southwestern corner of the Gordon Creek area of the Flatbed Property as indicated in Figure 4.3. Colonial's current Work Permit allows for the construction of an access trail into the property from this location.

Four kilometres southeast of the entrance to the Core Lodge Road, another all-weather road extends from the highway to access two O&G wells located along the northern edge of the Gordon Creek area. This road, referred to as Petroleum Development Road (PDR) 527, trends westerly for approximately 1.8km before turning south-southwest for 6.3km to terminate at the well sites as shown in Figure 4.3.

Approximately 32km south of Tumbler Ridge, Highway 52 intersects the northeastern portion of the Flatbed Property as indicated in Figure 4.3. From here the highway continues south through the eastern portion of the property. Within this eastern portion of the property, Highway 52 intersects numerous forestry and O&G roads, in different states of repair, many of which head westward, deeper into the property.

Along with the main access routes there are numerous historic seismic lines, cleared of timber (but largely re-grown with shrubs, bushes and deciduous saplings), that run into and across the property. Many of these seismic lines offer potential for partial use during the construction of future access trails.

5.2 CLIMATE

The climate is typical of northeastern BC; that is, short, warm summers and long, cold winters interspersed with periods of very cold temperatures, in the range of -15 degrees Celsius (°C) to -30°C. The cold spells usually happen between January and March but may occur as early as late October. Frost can occur throughout the year and the frost-free period averages less than 60 days per year. At Tumbler Ridge, the average temperatures for July and January are +20.8°C and -5°C, respectively. The town averages 334mm of rain and 1.85m of snow per year although significantly more precipitation can be expected in and around the higher areas within which the property is located. The prevailing wind direction is from the southwest and extended periods of high winds of more than 20km/h can



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Accessibility, Climate, Local Resources, Infrastructure and Physiography

occur at any time but are common from October onwards. Throughout the foothills belt, coal exploration programs are typically conducted between June and October, although winter programs can be carried out where there is road access.

5.3 LOCAL RESOURCES & INFRASTRUCTURE

The centre of the property is situated about 168km northeast of the city of Prince George and 131km west-southwest of the city of Grande Prairie, Alberta; the smaller cities of Fort St. John and Dawson Creek are located approximately 150km to the north and 101km to the north-northeast, respectively. Each of these cities is serviced by regularly scheduled flights from major western Canadian cities such as Vancouver, Edmonton and Calgary. The location of the property with respect to main population centres is shown in Figure 4.1.

The Flatbed Property is situated in a region within which large-scale coal mining has been carried out over much of the past 35 years. The locations of various elements of mine and rail infrastructure built in support of surrounding coal mines and advanced coal mine development projects are shown in Figure 4.2. A rail line (operated by CN Rail) is located approximately 7km northwest of the Flatbed Property where it terminates at the now closed Quintette mine coal load-out facility. PRC's wash plant for their currently idled Trend surface mine is located 4km west-southwest of the southern boundary of the Gordon Creek area, while their rail loadout facility is located 9km north-northwest of the property. The PRC plant and rail loadout sites are connected by the Core Lodge Road that leads to a dedicated haul road that passes close to the Flatbed Property's western boundary.

The operating Perry Creek surface mine, wash plant and rail loadout, owned by Conuma, and the surface facilities and decline for the Murray River underground coal mine development (operated by HD Mining International Ltd. (HD Mining)) are both located northwest of the Flatbed Property, by 25km and 10km respectively. The approximate location of the Perry Creek (Wolverine) and Murray River projects are indicated in Figures 4.2 and 4.3.

The Tumbler Ridge rail spur joins the CN Rail main line just north of Prince George and provides direct access to the coal export facility at Ridley Island, Prince Rupert, over a total distance of approximately 1,000km as indicated in Figure 4.1. The Tumbler Ridge Airport is located 7km north-northwest of the property whose location is shown in Figure 4.3.

There have been no improvements made to the property.

The Flatbed Property covers an area sufficient to host potential processing plant sites, tailings storage, waste disposal areas, settling ponds, and loadout facilities, subject to the acquisition of appropriate surface rights. However, the selection of sites would be subject to appropriate engineering and environmental studies and it is possible that some sites might be located outside, or extend beyond, the current property boundaries. The project is well located with respect to sources of mining personnel, power and water to support possible future mining.

5.4 PHYSIOGRAPHY

The property lies within the foothills (Inner Foothills Belt) of the Rocky Mountains, east of the Hart Ranges. The topography comprises a belt of gently sloping to steep-sided hills transected by a series of mature, easterly- to northeasterly-flowing rivers and major creeks that form the primary drainage system. The major rivers closest to the



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property are the Murray and Wolverine Rivers, which lie approximately 9km and 25km to the northwest, respectively, and the Wapiti River which is located approximately 18km to the southeast. In contrast to the regional pattern, several drainages flow against this regional trend. For example, south of the property, Kinuseo Creek flows west, then northwest, while north of the property Flatbed Creek flows northwesterly; both empty into the Murray River.

Five northerly-flowing creeks cut through the property; namely, Babcock Creek which, together with its tributary Gordon Creek, drains the northwestern portion of the property. The upper reaches of Flatbed Creek and its tributaries, Calamagrostis and Hambler Creeks, drain the central, southern and eastern parts of the property (see Figure 4.3). Approximately 8km northeast from where Babcock Creek leaves the property it empties into the northwesterly flowing portion of Flatbed Creek.

The topography of the property varies from rolling hills in the north, east, and south, to more steeply-sided hills with moderately-sloping uplands in the west. Elevations range between 960m to 1460m above sea level. The highest elevations occur in the southern parts of the Gordon Creek area and western portion of the overall Flatbed Property. The lowest elevations are found around Flatbed Creek in the eastern portion of the property.

Vegetation in the area is predominantly boreal to sub-alpine coniferous forest. Tree line in this region varies between 1,550m and 1,600m; above these elevations the alpine vegetation consists of stunted and/or dwarf varieties of spruce and fir, juniper, moss, heather and other alpine tundra flora, and occasional sub-alpine meadows. The area is heavily forested at elevations below approximately 1,500m. The forest consists mostly of sub-alpine Engelmann and white spruce, sub-alpine fir, and lodgepole pine. Douglas fir, balsam poplar, aspen, willow, and alder are also found. Bogs and black spruce stands cover some lower areas. The timber on most of the property appears to be of little if any economic interest, although merchantable stands of timber may be present in areas of lower elevation. Recent logging, evidenced by mostly smaller-sized cut-blocks, has taken place in the lower, northern and eastern parts of the property.

Exposed rock is common above tree line but is infrequently seen on treed slopes and hilltops; at lower elevations bedrock exposures are usually limited to the bottoms and steep sides of creeks. Various surface materials and soils are present, differing, to some degree, on elevation and moisture supply. Benches of moraine deposits are sometimes present at lower elevations, and major valleys may contain areas of finer-textured lacustrine and scattered organic deposits (mostly as bogs), glacio-fluvial fans and terraces.



History

6.0 HISTORY

6.1 INTRODUCTION

Although coal was first discovered in the Peace River region in 1793, subsequent operations were limited to small tonnages to serve local needs. The expansion of steel production in the mid-1960s, led by the Japanese steel mills, stimulated worldwide exploration for metallurgical (or coking) coal. In western Canada, exploration focused largely on coal deposits located within the Rocky Mountain Foothills of BC and Alberta. By the mid-1970s, most of the land within the Peace River Coalfield that contained a potential for surface and underground mineable coal had been acquired by various mining and O&G companies. The town of Tumbler Ridge and the rail spur connecting with the main CN rail line were constructed to support production from the Quintette (1983 to 2000) and Bullmoose (1984 to 2003) coal mines. Coal mining in the Tumbler Ridge region re-started in 2006 with the opening of the Perry Creek (Wolverine) and Trend Mines, with the Brule Mine entering production in 2007 (MEMPR, 2007 and 2008). Although the downturn in coal markets in 2013 through 2016 caused each mine to be put into care and maintenance, the Brule and Wolverine Mines re-started operations in 2016 and 2017, respectively (MEM, 2015 and 2017). The Willow Creek coal mine, located 38km west of Chetwynd (see Figure 4.2), was re-opened in 2018.

6.2 PRIOR OWNERSHIP

Portions of the Flatbed Property have been held in the past by two different companies; namely, Denison from the early 1970's to mid-1980's, and Kennecott between 2007 and 2009.

6.2.1 Denison Mines Limited

From the early 1970's to mid-1980's the area either side of Gordon Creek formed part of Denison's large Quintette coal property (Denison, 1973). The Quintette property's coal licenses extended as far as the drainage divide between Gordon and Calamagrostis Creeks, across an area that now forms part of Flatbed coal licenses 418,548 and 418,549 (see Figure 4.4). The original Denison coal licenses made up part of the Babcock area within the larger Quintette property. Denison reduced the size of the Quintette property sometime after 1984 (Gormley, 1986) and the old licenses that covered this part of the current Flatbed Property were forfeited to the Crown. The residual part of the old Babcock block is now held by Teck, (as part of a smaller Quintette property) and hosts their proposed Window Pit on Babcock Mountain.

6.2.2 Kennecott Canada Exploration Inc.

In 2006 Kennecott acquired the core block of coal licenses for the Murray River Coal Property. In 2007, this block was expanded to the southeast to include an area now covered by most of the western, northern and eastern parts of the current Flatbed Property; more specifically, portions of licenses 418,548 through 418,550 and 418,913 plus all of licenses 418,551 and 418,553 (Kennecott, 2007). This southeastern extension of the Murray River property was forfeited to the crown in 2009. The current Murray River property is now held by HD Mining, who is developing an underground coal mine approximately 10km northwest of the Gordon Creek area (Norwest, 2010).



History

6.3 SUMMARY OF PREVIOUS EXPLORATION

Very little previous exploration for coal has been conducted on the Flatbed Property. In the early 1970's Denison carried out geological mapping along Babcock and Gordon Creeks (Mitsui, 1974). Kennecott did not perform any exploration on the Flatbed Property.

6.4 HISTORICAL RESOURCES

No previous resource estimates have been determined for any part of the Flatbed Property.



7.0 GEOLOGICAL SETTING AND MINERALIZATION

The Flatbed Coal Property lies within a belt of Mesozoic strata that form part of the Rocky Mountain Foothills of northeastern BC. Coal seams of greatest potential are found within Lower Cretaceous strata, consisting of the Bullhead and Fort St. John Groups. The relative location of the various formations that comprise the Bullhead and Fort St. John Groups can be viewed in Figure 7.1 (Section 28, Illustrations). The stratigraphy of this succession broadly represents an alternating sequence of marine shales as well as marine and non-marine clastic lithologies deposited from a series of transgressive and regressive cycles in response to periodic uplift of the Cordillera. On the Flatbed Property, only the coal seams of the Gates Formation are considered to offer any potential for mining due to depth considerations.

7.1 REGIONAL STRATIGRAPHY

The following geologic formations of relevance to the coal resources identified in the Gordon Creek area of the Flatbed Property are discussed below from oldest to youngest.

7.1.1 Gates Formation

The Gates Formation conformably overlies the Moosebar Formation, which comprises the lowest formation of the Fort St. John Group. The Gates contains the largest systematically explored coal resources within the Northeast Coal Block and is the main coal-bearing unit within the project area. Within the Tumbler Ridge region, the Gates Formation is divided into three informal sub-divisions; namely, Quintette member, middle Gates and upper Gates. The main coal seams occur within the middle Gates while thinner, usually non-economic, coal seams are present within the upper Gates. In the Flatbed Property, the Gates Formation ranges between 250m and 310m in thickness. A generalized stratigraphic section through the Gates Formation is illustrated in Figure 7.1.

The lower portion of the formation is informally referred to as the Quintette member. It comprises resistive, massive, light grey, medium-grained sandstone, with minor carbonaceous and conglomeratic horizons, that form prominent cliffs and ridges when cut by the topography. These physical features can often be used to outline the various structural configurations of the coal measures. Within the Flatbed Property, the Quintette member has an approximate thickness of 75m.

The Quintette member is overlain by several cycles of coal deposition represented by fining-upward sequences culminating with coal deposition. This sequence is referred to as the middle Gates and ranges between 90m and 160m in thickness. Typically, in the Tumbler Ridge region, the only Gates Formation coal seams of economic interest are found within the middle Gates. These coal seams often display consistent thicknesses and internal seam characteristics across significant distances and are relatively easy to correlate.

The middle Gates is commonly overlain by a massive, medium-to-coarse-grained, conglomeratic sandstone and pebble conglomerate sequence informally called the Babcock member. The member is also very resistant to weathering and forms an important marker horizon when exposed. The pebble-conglomerate phases may come and go laterally, but the sandstone appears always to be represented. The Babcock member is overlain by predominantly finer grained lithologies consisting mostly of intercalating fine-grained sandstone, siltstone and claystone with several



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thin coal seams; taken together, this sequence is referred to as the upper Gates. Atypically, in the Gordon Creek area, the upper Gates contains a coal seam of potential economic importance (Seam B). A thin bed of large granule to pea-size conglomerate, set within a clean sandstone matrix, marks the contact with the overlying marine sediments of the Hulcross Formation.

7.1.2 Hulcross Formation

The Hulcross Formation is a marine sequence, predominantly composed of blocky, light to medium grey, sandy shale with thin interbeds of siltstone and very fine- to fine-grained, often laminated or cross-laminated sandstone. Across the Flatbed Property, the Hulcross Formation varies in thickness from approximately 68m to 91m. The contact between the Hulcross and Boulder Creek Formations lies at the top of a thin (5m to 10m) sequence of interbedded platy sandstone, siltstone and shale, where it is abruptly overlain by continuous, thick-bedded sandstone belonging to the Boulder Creek Formation.

7.1.3 Boulder Creek Formation

The Boulder Creek Formation ranges between 122m and 147m in thickness and can be divided into three lithological units. The lower unit consists mainly of light grey, fine-grained sandstone and conglomerate with minor siltstone beds, ranging from 14m to 40m thick. The middle unit is approximately 45m to 84m in thickness and is predominantly made up of medium to dark grey claystone and siltstone with occasional thin coaly and carbonaceous horizons. Many fine- to medium-grained sandstone beds, up to 2.20m in thickness, are also present. The upper 24m to 70m of this formation consist mostly of fine- to medium-grained, grey, interbedded sandstone and siltstone; multiple thin conglomeratic beds are also present. In the Gordon Creek area, the contact between the Boulder Creek Formation and the overlying Shaftesbury Formation is well defined by a layer of conglomerate, sometimes containing a thin siltstone or claystone parting, which ranges in thickness from 0.5m to 0.85m which sits atop approximately 10m of light grey, medium grained sandstone.

The thickness of the Boulder Creek Formation tends to increase as the Hulcross thins; in the Flatbed area the combined Boulder Creek – Hulcross sequence is approximately 213m to 215m thick.

7.1.4 Shaftesbury Formation

In the region of the Flatbed Property, Shaftesbury Formation strata are undivided whereas a few tens of kilometres to the northwest these strata are sub-divided into three units which are referred to, in ascending stratigraphic order, as the Hasler, Goodrich, and Cruiser Formations (Stott, 1968).

The lower unit (the Hasler Formation) consists of light to medium grey, claystone, siltstone, minor sandstone and sideritic concretions. The unit is often homogenous with bedding only being discernible through occasional appearance of thin beds of sandstone.

The middle unit (The Goodrich Formation) is predominantly a grey to brown, medium-grained, laminated to medium-bedded to massive, micaceous sandstone. Carbonaceous claystone and siltstone occur as interbeds.



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The upper unit (The Cruiser Formation) comprises dark grey to black, laminated to thinly interbedded silty claystone, siltstone and fine-grained sandstone. Pebble bands occur locally. This unit is characteristically light orange to red in colour due to weathering of ferruginous beds.

Shaftesbury Formation lithologies penetrated by cores in the Gordon Creek area appear to represent only the lower (Hasler equivalent) of the formations found further northwest.

7.2 COAL SEAM DEVELOPMENT

Within the Northeast Coal Block, the coal seams of greatest economic potential are found within Lower Cretaceous strata of the Gething and Gates Formations. The coal seams of the Gates Formation are well established as the most prolific coal-bearing strata in the southern portion of the Block while the coal seams of the Gething Formation are the most prolific in the northern half. Consequently, exploration carried out in the Tumbler Ridge region has primarily targeted coal seams within the Gates Formation, although some projects have also examined the potential for economic coal seams in the Gething Formation. In the project area, it is the Gates coal seams that have provided the impetus for local mine development. All 2017 drilling on the Flatbed Property targeted Gates Formation coal seams. Consequently, only Gates coal seams are discussed in this report.

7.2.1 Gates Coal Seams

Significant thicknesses of Gates coal first occur in the Bullmoose Mountain area and continue southeast to the B.C./Alberta border, a distance of almost 140km, and beyond. Adjacent to the Gordon Creek area, at Babcock Mountain and Roman Mountain, the aggregate economic coal seam thicknesses of 15m to 18m (Perry, 2004) are common. Total thickness of the main coal seams on the Flatbed Property is approximately 21m.

The main Gates Formation coal seams can be correlated throughout the entire Gordon Creek area of the Flatbed Property. Seam correlations are also well established with the adjoining Babcock property, situated to the west and Trend property to the southwest. From youngest to oldest the coal seams have been called B, C, D, E, F1, F2, G, J and K. Seam C, found together with Seam B within the upper Gates, is not sufficiently well developed to present economic potential.

7.3 STRUCTURE

The structural geology of the area around the Flatbed Property is dominated by a series of folds and thrust faults typical of Canadian Rocky Mountain Foothills structures. The nature of the regional folding and faulting, together with the distribution of main stratigraphic units, is illustrated in Figure 7.2 (Section 28, Illustrations) (Legun, 2002).

To the southwest of the property, the Roman Mountain and Trend areas are defined by a large-scale syncline-anticline-syncline triplet (from west to east: the Murray Syncline; Waterfall Creek Anticline; and, the Waterfall Creek Syncline). The Babcock Mountain area comprises an asymmetrical anticline, having a short, steep western limb as its paired limb with the Waterfall Creek Syncline, and a broad, gently westerly-dipping crest. The foregoing structures are illustrated in Figure 7.3 (Section 28, Illustrations). The common limb of the Waterfall Creek Anticline - Syncline pair trends along the southwest boundary of the property and hosts PRC's Trend coal mine. The Babcock Mountain structure extends into the northwest corner of the Flatbed Property. Regional maps prepared by BC Government



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geologists (Legun, 2002) indicate that the frequency of major folds appears to lessen towards the northeast although several major thrusts may be present.

7.4 PROPERTY GEOLOGY

Definition of the geology to the east of Trend mine and Babcock Mountain is complicated by a lack of exposed rock and recognisable marker horizons. Regional mapping (Legun, 2002) has incorporated information from widely-spaced O&G wells which has allowed broad geological interpretations to be presented. The southwestern half of the property appears to host generally shallow-dipping strata while a broad, shallow syncline, containing Upper Cretaceous strata of the Dunvegan and Paskapau Formations is shown to be present in the south. A sharp, anticline cored by strata of the Hulcross and Boulder Creek Formations is present in the eastern part of the property. The fold axis of this anticline trends NW-SE and plunges in both directions.

The Gordon Creek area of the Flatbed Property, where the coal resources have been defined, is located along the southwestern limb of the anticline. The strata along the southwestern limb dip approximately 11° towards the southwest. A major high-angle thrust fault bisects the Gordon Creek area. This fault, herein called the Flatbed fault, strikes parallel to the NW-SE regional structural trend. Geology specific to the Gordon Creek area is discussed in the Mineralization subsection below.

The thickness of unconsolidated overburden observed in the various drillholes ranges between approximately 11.28m (from drillhole FD17-02) and 92.15m (from drillhole FD17-01). Most of this appears to consist of glacio-fluvial or glacio-lacustrine material. At its contact with the unconsolidated overburden, Shaftesbury Formation lithologies are often weathered and highly broken to semi-coherent for the top 3.05m (FD17-02) to 13.64m (FD17-01).

7.5 MINERALIZATION

The following summary of coal seam descriptions focuses on those coal seams intersected during the 2017 drilling program and from O&G wells at the Flatbed Property's Gordon Creek area.

A total of 8 main coal seams are present within the Gordon Creek area; one minor seam (Seam C) is also present. Seam nomenclature used in this report follows that used currently at the Trend operation and at Babcock. In ascending order, the main seams are labelled as K, J, G, F2, F1, E, D, and B. These seams correlate directly with similarly designated coal seams on adjoining properties.

All seams, except for Seam C, provide potentially mineable coal intervals. Although not considered to be mineable, Seam C can still be traced geologically throughout the deposit. Since it is not considered to hold any economic importance it is not discussed further, herein.

The main characteristics of each of the main coal seams are summarized below. Overall seam thickness ranges for the Gordon Creek area are outlined in Table 7.1; these true thicknesses, sourced from the Norwest coal resource model, were all calculated using a southwest dip of 11°. True thickness ranges and interseam true thicknesses discussed below, are taken from Colonial's exploration drillholes and the two O&G wells while the internal seam characteristics described below, are taken from exploration drillhole FD17-01.



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Table 7.1 Gordon Creek Area Coal Seam Thickness Ranges

Seam	True Thickness (m)	
	Minimum	Maximum
B	1.26	3.69
D	2.28	2.65
E	1.19	1.71
F1	1.28	1.65
F2	2.55	4.49
G	1.69	3.16
J	3.38	5.30
K	1.95	3.17

7.5.1 Seam K

Seam K ranges in true thicknesses from 1.95m (B-30-K) to 3.17m (FD17-01). It is characterized by comparatively clean lower (2.34m) and upper (0.45m) sections separated by a 0.38m claystone band.

Regionally, this seam is often referred to as Seam K1, as there is another coal seam that often sits below K1 that is called K2. In O&G wells B-029-K and B-030-K, Seam K2 is situated approximately 50m below K1. At the Trend mine and on Babcock Mountain, the separation between the two K seams is often less than 10m. Due to drillhole depth limitations, Seam K2 was not penetrated and tested during 2017 to determine if it is of economic interest.

The stratigraphic interval between Seam K and the overlying Seam J, increases northward within the Gordon Creek area, ranging from 22.29m (FD17-01) to 29.48m (B-030-K).

7.5.2 Seam J

The true thickness of Seam J ranges from 3.38m (FD17-01) to 5.30m (B-30-K). It is characterized by relatively clean lower (1.75m) and upper (1.37m) sections, separated by a carbonaceous rock band that is approximately 0.26m thick.

A thin (0.51m) clean coal split is situated approximately 1.2m above Seam J and is separated from the main seam by a zone of carbonaceous claystone and poor coal bands. This upper section is referred to herein as J upper (JU) as it does not meet the necessary criteria to be included with the main part of the seam for resource determination. It is possible that JU correlates with Seam I at Trend and Babcock.

Within the Gordon Creek area, the stratigraphic interval between Seam J (inclusive of JU) and the overlying Seam G, increases northward, ranging from 21.89m (FD17-01) to 52.27m (B-029-K).



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Geological Setting and Mineralization

7.5.3 Seam G

Seam G true thickness ranges from 1.69m (B-029-K) to 3.16m (FD17-01). It is characterized by a thin, relatively clean lower coal section (0.79m) and a thicker (2.04m) upper section, separated by a 0.33m siltstone band. The upper part contains two distinct, thin, poor coal and rock partings.

The stratigraphic interval between Seam G and the overlying Seam F2 decreases northward from 17.48m (FD17-01) to 7.81m (B-029-K).

7.5.4 Seam F2

Seam F2 ranges in true thickness from 2.55m (B-030-K) to 4.49m (FD17-01). It is characterized by a thick (3.46m), relatively clean, lower section with a thinner (1.03m) upper section that contains two thin, poor coal and rock partings.

Seam F2 is separated from the overlying Seam F1 by approximately 0.40m (B-029-K) to 3.46m (FD17-01). This thickness interval decreases towards the northern end of the Gordon Creek deposit, such that the two seams essentially coalesce in B-029-K to form a single, thicker Seam F although, for resource definition purposes, the seams have been picked as F1 and F2. At the adjoining Babcock property, both F1 and F2 are sometimes present, although only one of these seams is present at the equivalent horizon at Trend.

7.5.5 Seam F1

Seam F1 true thickness ranges from 1.28m (B-030-K) to 1.65m (FD17-01). It is characterized by a relatively clean bottom third (0.64m) which contains just one parting of high-ash coal. The rest of the seam (1.01m) contains several thin poor coal and rock partings throughout, the most prominent of which is near the top of the seam. Within the Gordon Creek deposit, Seams F1 and F2, together with the intervening rock band, form a single mining section that is referred to as Zone F.

The separation between Seam F1 and the overlying Seam E increases slightly towards the north, ranging from 7.77m (FD17-01) to 10.65m (B-030-K).

7.5.6 Seam E

Seam E true thickness ranges from 1.19m (FD17-01) to 1.71m (B-029-K). It is the thinnest of the seams intersected during the 2017 drilling and is characterized by relatively clean lower and upper coal sections (0.63m and 0.38m, respectively) that are separated by a thin (0.18m) poor coal/carbonaceous rock band.

The inter-seam thickness between Seam E and the overlying Seam D decreases significantly towards the north, ranging from 23.41m in FD17-01 to 9.35m in B-030-K.

7.5.7 Seam D

Seam D true thickness ranges from 2.28m (FD17-01) to 2.65m (B-030-K). The bottom half of the seam contains higher ash coal near the floor while the upper half is characterized by two rock partings ranging between 0.11m and 0.21m in thickness. The roof of this seam is composed of conglomerate.



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The inter-seam thickness between Seam D and the overlying Seam B is fairly consistent across the Gordon Creek area, decreasing only slightly northward from 64.95m (FD17-01) to 61.28m (B-029-K).

7.5.8 Seam B

Seam B is atypical for this region in that this seam has not been reported to reach potentially economic seam thicknesses or be of sufficient coal quality on adjoining projects. At Gordon Creek, Seam B ranges in true thickness from 1.26m (B-029-K) to 3.69m (FD17-03A). The seam contains a number of high-ash coal and rock partings that increase in thickness and frequency upwards. In FD17-01, the roof of this seam is composed of very high ash (stony) coal to very highly carbonaceous claystone; this horizon appears to be replaced by good coal in FD17-03A, to yield a thicker coal seam.

7.6 GORDON CREEK STRUCTURE

The structural interpretation for the Gordon Creek area presented herein was determined through observation of coal exploration drilling results, O&G well logs, and from regional structural plans compiled by the BC Government geologists (Legun, 2002). Other data of potential benefit to the project included surface mapping within the property and O&G exploration seismic data. These data were ultimately not used in the geologic model for the following reasons:

- Surface mapping was observed to be ineffective due to surface exposure being limited to non-coal bearing Shaftesbury Formation mudstones along Gordon Creek. The bed orientation measurements of weathered mudstone along the creek bed were considered too inaccurate to be used in the geologic model other than confirming an overall northwest regional strike of overburden units.
- The seismic reflection survey data acquired by Colonial from prior O&G exploration programs was found to be too low-resolution at the relatively shallow depths of the target coal seams, when compared to the gas reservoirs some 1,500+ metres below. As such, the seismic data were not useful for the correlation of coal seams or for structural interpretation.

Within the Gordon Creek area there is no potential for coal seams of interest to crop out. The depth below surface of the coal seams intersected by drilling within the resource area varies from approximately 390m for Seam B near the northern limit of the coal resource area, to 900m in the south, near the western boundary of the property. Figures 7.4 and 7.5 (Section 28, Illustrations) show the overburden depths to the uppermost Seam B and lowermost Seam K, respectively.

The contact between the Shaftesbury and Boulder Creek Formations (SB-contact), located above the Gates Formation, was used as a reference point from which to interpret the structural trends and depth intervals of the coal beds. The SB-contact described in Section 7.1.3 is easily recognisable in the exploration drill cores and geophysical gamma logs.

Correlation of the SB-contact, penetrated in three of Colonial's exploration drillholes (FD17-01, FD17-02 and FD17-03A), was used to define a reference dip plane. Grid estimates of apparent (vertical) thicknesses of coal beds and intervening waste rock were stacked below this reference plane to develop a geological model; the coal seams within



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the defined resource area dip towards the southwest (striking northwest) at 11°. Structure contour maps for the two confining coal seams, Seam B and Seam K are shown on Figures 7.6 and 7.7 (Section 28, Illustrations), respectively.

A major resource-limiting fault is located between drillhole FD17-03A/well B-030-K and well B-029-K as shown in Figures 7.6 and 7.7. This fault, called the Flatbed fault, is interpreted to follow the regional structural trend and strike northwest. The displacement along the Flatbed fault is estimated to be approximately 1,200m, downthrown towards the northeast. Between drillholes FD17-03A and FD17-04, the fault is interpreted to split, with the split rotated to a north-northwest orientation. No marker bed horizon was penetrated in drillhole FD17-04 and the near vertical bed orientations observed at depth in this drillhole indicates that the drillhole was collared atop a major fault zone likely associated with the Flatbed fault.

There is insufficient exploration data to determine the orientation of the Flatbed fault at depth. However, exploration and mining activities in the region have shown major faults to have a near vertical orientation near surface. Consequently, the Flatbed fault and its associated splay are interpreted to be vertical. A southwest oriented geologic cross-section illustrating the impact of the Flatbed fault on the coal seams can be observed in Figure 7.8 (Section 28, Illustrations).



Deposit Types

8.0 DEPOSIT TYPES

Coal deposits are assessed relative to "Geology Type" and "Deposit Type". The term "Geology Type" is defined relative to the structural complexity of the coal deposit. GSC Paper 88-21 (Hughes, et al, 1989) assigned specific parameters to the term "Geology Type" for coal deposits. These specific parameters define the range of criteria used to complete resource and reserve estimation. The more structurally complex the "Geology Type" is for a coal deposit, the less confidence there is in areas that are further away from a specific reference point (i.e. drillhole). There are four categories of "Geology Type", which include:

- Low - coal deposits that have undergone low tectonic disturbance (i.e. plains-type coal deposits)
- Moderate - coal deposits that are moderately deformed
- Complex - coal deposits that are highly deformed
- Severe - coal deposits that are extremely deformed (i.e. Rocky Mountain-type deposits).

The interpretation of the Geology Type for the Gordon Creek area of the Flatbed Property is Moderate. GSC Paper 88-21 describes Moderate Geology Type as: "characterised by homoclines or broad open folds (wavelength greater than 1.5km) with bedding inclinations generally less than 30°. Faults may be present but are relatively uncommon and generally have displacements of less than ten metres."

The term "Deposit Type," as outlined in GSC Paper 88-21, assigns the extraction method that is most suited to a specific coal deposit. There are four "Deposit Type" classifications, which include:

- Surface
- Underground
- Non-Conventional
- Sterilized.

The interpretation of the Deposit Type as outlined in GSC Paper 88-21 for the Gordon Creek area of the Flatbed Property currently under discussion is Underground only.



Exploration

9.0 EXPLORATION

9.1 PREVIOUS EXPLORATION

9.1.1 Oil and Gas

The region within which the Flatbed Property is situated has seen significant O&G exploration and development over the past 40 years, as a result there are many O&G wells in the Flatbed Property area. These wells were drilled to vertical depths of approximately 1,000m to 5,500m from surface (Norwest, 2012). Available data from these wells may include: well locations, deviations surveys, hard and digital copies of geophysical log profiles, plus approximate intervals of major formations and basic lithologic descriptions.

Within the property there are four O&G wells; two are situated in the northwest part of the property, in the Gordon Creek area, while the other two are located in the southeastern portion of the property. Each of these wells intersected the coal-bearing Gates Formation and three have geophysical logs available that intersected the coal measures. Based on the geophysical logs, significant coal seams are evident within the Gates Formation. However, due to the distance between the northwestern and southeastern wells, precise correlation of each of the coal seams between these two areas is difficult. The locations of the O&G wells that are located within the Gordon Creek area are shown in Figure 9.1 (Section 28, Illustrations). There is evidence of numerous historic seismic lines both within and around the Flatbed Property; the locations of these seismic lines are not shown on the diagrams, herein.

9.1.2 Coal

Since the early 1970's, there has been significant coking coal exploration throughout the belt of coal measures that hosts the Flatbed Property. Principal amongst these are the adjoining Duke Mountain (south), Trend (southwest), Quintette - Babcock (west), and Murray River (northwest) properties. Many tens of exploration holes have been drilled on each of these properties (often on multiple targets within a single property), together with exploration adits and trenches, to evaluate the mostly surface mining potential. Of the four projects listed, mines have been developed at Trend and Quintette, and all but the Duke Mountain property have seen significant exploration and development of mines and/or advanced projects since 2004.

9.2 COLONIAL EXPLORATION

9.2.1 Colonial 2010-2013

Colonial personnel spent a total of five days over the summers of 2010 (three days) and 2013 (two days) performing reconnaissance and 1:2,500 scale geological mapping on the property as well as inspecting proposed access routes in support of a future drilling program. The geological mapping focused primarily on the west of the property along the upper and lower reaches of Gordon Creek and around the confluence of Gordon and Babcock Creeks. Outcrops in the east of the property, along Flatbed Creek and Hambler Creek, were also examined.



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Exploration

9.2.2 Colonial 2017

The first significant exploration program conducted by Colonial on Flatbed was in the summer-autumn period of 2017; fieldwork commenced in mid-July and was completed by mid-October. Prior to the field program, Colonial acquired O&G three dimensional (3D) seismic information that extended across the Gordon Creek area. It was hoped that these data could provide information on the depths from surface of prospective coal seams and highlight any large structural discontinuities that might be present. However, the data were poorly resolved at the relatively shallow depths of the targeted coal seams, when compared to the gas reservoirs some 1,500+ metres below. As such the seismic data were not useful for the correlation of coal seams and structural interpretation.

The primary objectives of the 2017 exploration work were to identify potentially underground mineable coal resources within the Gates Formation and to establish initial coal quality parameters. Activities focused on the Gordon Creek area, located in the northwestern portion of the property, which hosts one of the main targets identified by an independent review of O&G well data (Norwest, 2012).

Work focussed upon the drilling of five, HQ-size, diamond drillholes on four widely-spaced drill sites for a total of 2,831.84m of drilling. Associated activities included: down-hole geophysical logging; geological core description; coal plus seam roof and floor core sampling; geotechnical logging, sampling, and on-site testing; plus limited geological mapping. Core samples were submitted to Birtley Coal and Minerals Testing (Birtley) (Calgary, Alberta) for coal quality analysis and to Golder Associates Ltd. (Burnaby, B.C.) for geotechnical testing. Exploration personnel were housed at a hotel in Tumbler Ridge. The main exploration activities carried out during the 2017 program are summarized in Table 9.1.

During the 2017 exploration program all drillhole locations were surveyed by KMD Surveying Services. The easting and northing locations in the Universal Transverse Mercator (UTM) system and the elevations were recorded to sub-centimetre accuracy and can be found listed in Section 10 of this report.

Three days of detailed geological mapping was carried out along Gordon Creek to further define outcrop locations and strata geometry to aid in structural interpretations.

Table 9.1 Summary of 2010 - 2017 Exploration Activities

Year	Geological Mapping	Drillholes (HQ)	Surveying
2010	Rec. & 1:2500	-	-
2013	Rec. & 1:2500	-	-
2017	Rec. & 1:2500	5	Drillholes

The results obtained from the 2017 exploration at Flatbed, in conjunction with selected data from historical O&G wells, were identified as sufficient for estimating coal resources and coal quality characterization within the Gordon Creek area of the Flatbed Property. Details of the results obtained and interpretations formed from the 2017 exploration program are presented together with the retained historical data in Sections 10 through 14 of this report and are summarized in Section 1.



Drilling

10.0 DRILLING

Colonial's 2017 exploration program was the first ever drill program conducted for coal on the property. Drilling focused on the northwestern portion of the property in what is referred to as the Gordon Creek area. This area is shown on Figure 9.1 which is one of the main target areas identified by an earlier independent review of O&G drilling results from within and immediately surrounding the property (Norwest, 2012). A total of five, HQ-size, diamond drillholes were cored on four, widely-spaced sites for a total of 2,831.84m of drilling. Drillhole locations are shown in Figure 9.1. Drilling collar co-ordinates are listed in Table 10.1 and the details of the drilling activities are summarized in Table 10.2.

Table 10.1 2017 Drillhole Locations

Drillhole	UTM NAD83 Zone 10		Elevation (m)
	Easting (m)	Nothing (m)	
FD17-01	635,351.620	6,088,447.782	1,211.887
FD17-02	635,419.162	6,086,618.073	1,240.396
FD17-03	636,168.671	6,089,995.099	1,235.996
FD17-03A	636,169.421	6,089,996.091	1,236.007
FD17-04	637,147.413	6,088,568.996	1,277.451

Table 10.2 2017 Drilling Summary

Drillhole	Core Size	Metres Drilled	Geophysical Logs
FD17-01	HQ	866.39	d,g,n,c,fr,dev,s
FD17-02	HQ	608.38	-
FD17-03	HQ	297.79	-
FD17-03A	HQ	513.08	*g,c,dev,dm
FD17-04	HQ	546.20	*g,c,dev,dm
Total		2,831.84	

Notes: i) * = not geophysically logged to total depth; ii) d,g,n,c,fr,dev,s,dm = density, gamma, neutron, caliper, focussed resistivity, deviation survey, sonic, and dipmeter logs.

All the drill sites were accessed and supported by helicopter. The purpose of the 2017 work was to identify potentially underground mineable coal resources within the Gates Formation (which hosts established surface and underground mineable coking coal reserves and resources on a number of projects to the south, west and northwest of the Flatbed Property) and to establish initial coal quality parameters.

Three of the five 2017 drillholes were geophysically logged to provide a combination of density, gamma, neutron, caliper, focused resistivity (or, short guard resistivity), deviation, sonic and dipmeter logs. All drillhole angles were vertical (-90°); deviation logs showed only minor amounts of variation from vertical at the bottom of the drillhole or at the base of the logged interval.



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The geology of the property has been characterized from geological mapping, drill core descriptions, and interpretations of geophysical logs obtained from the drillholes. Analytical data obtained from HQ-size drill core have been used for coal quality characterization.

In addition to the drillholes shown in Table 10.1 and 10.2, the exploration database contains information derived from two gas wells; namely, B-030-K and B-029-K. These wells are located along the northern boundary of the Gordon Creek area as shown in Figure 9.1. Data from these wells have been used to provide additional control for geological interpretation and resource estimation purposes.

Coal seam thicknesses from exploration drillholes are measured along the length of the hole. As the angle of intersection between the hole and the seam is often not perpendicular to dip, these intersections represent an 'apparent' rather than 'true' thickness of the seam. Adjustment from apparent to true seam thickness is negligible in the case of the Gordon Creek area due to the very low angle of dip to the coal seams (approximately 11°) and hence very minor corrections would be required for true thickness.



11.0 SAMPLE PREPARATION, ANALYSIS, AND SECURITY

11.1 SAMPLING METHOD AND APPROACH

All samples obtained from Gordon Creek deposit coal seams were taken from HQ-size core produced by diamond drilling.

Core handling and sampling followed these general procedures: at the drill rig, cores were placed in numbered wooden boxes that were covered prior to transport to the core yard for description and sampling. Plastic liners were used in the boxes that held coal core sections. At the core yard, drill cores were washed (with water) and photographed prior to being described for general lithology, bed thickness and collection of structural/geotech data. Coal seams were logged in detail with specific coal intervals being characterized according to their 'brightness' (i.e. the amount of bright coal present). Samples were placed into plastic bags, with all samples being double-bagged. These bags were then placed into 20 litre plastic buckets and shipped to the selected laboratory for testing. Each bag contained a sample tag that recorded sample number, drillhole ID and seam designation. The sample number and drillhole ID was also written on the outside of the bags and buckets. A set of sample tags was retained by the company. All coal cores, whether in core boxes or sample bags/buckets, were stored in a -15°C walk-in freezer from the time they arrived in the core yard until the time they were shipped to the laboratory.

None of the sample collection was conducted by an employee, officer, director, or associate of Stantec.

Coal core handling, description and sampling procedures used by Colonial in 2017 are as follows:

- All core samples were sent to independent laboratories for testing.
- For each sample interval, the entire core was submitted for analysis. Immediate roof and floor lithologies were also sampled to determine the nature of potential out-of-seam dilution that would occur during mining.
- Core recoveries were obtained by comparing the lithological logs to the detailed density geophysical logs. For the coal seams, recoveries ranged from 53% to 100%; all but one were 68% or greater.
- The samples were shipped by Greyhound CDA Trans Corp to Birtley (a division of GWIL Industries) in Calgary, Alberta.
- Coal core logging and sampling followed prescribed guidelines to ensure a consistent approach by each geologist. The approach used for sample selection is consistent with industry standards.

All 2017 drillholes that intersected the full coal measures were geophysically logged for gamma ray, sidewall density, caliper, focussed resistivity (also called short guard resistivity), neutron, deviation and sonic logs. The geophysical logs were evaluated for lithological types in addition to comparison and reconciliation of the detailed density logs to coal seam core descriptions, in order to ensure accurate determinations of seam thickness, identification of lithological variations, core recoveries and appropriate characterization of any missing core.

In northeast BC, coal core recovery from HQ-size core drilling of Gates Formation coal seams is often highly variable. Coal seam core recoveries for each of the Gordon Creek Project coal seams are as follows: Seam B: 83%; Seam D: 68%; Seam E: 83%; Seam F1: 100%; Seam F2: 100%; Seam G: 78%; Seam J: 99%; and, Seam K: 53%. For Gates coal seams, potential sample bias is of concern mostly with regard to quantification of in-situ ash content and, hence, specific gravity (SG) and washing yield. The variability exhibited for in-situ ash content primarily reflects the thickness



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and continuity of in-seam rock partings. Although inherent ash produces some variability, its effect is usually minor in comparison to the in-seam partings. Rock partings and coal splits are quantifiable from the geophysical logs and so the effects of the exhibited coal and/or rock loss can reasonably be mitigated by mathematical adjustments to the coal quality data. Consequently, it is considered that coal quality data presented herein, and for the classification level of the resources defined herein, are representative and that any sample bias is within laboratory and industry standards.

The results obtained from representative samples and composites are presented in Section 13 of this report.

11.2 SAMPLE PREPARATION AND ANALYSES

Sample preparation and analysis was carried out at recognized, commercial laboratories experienced with requirements for coal testing, and can be summarized accordingly:

The 2017 HQ-sized core samples were sent to Birtley (a division of GWIL Industries), Calgary, Alberta. Pearson & Associates (Victoria, B.C.) carried out coal petrography.

Each laboratory adheres to internal QA/QC protocols and criteria. Elements of quality control employed by Colonial included reviews of analytical data obtained from incremental (in-seam) samples and full seam sample composites. Standard checks included comparison between ash values with coal density and FSI results. Also included were comparisons of analyses with core descriptions and/or detailed geophysical logs. Samples deemed to be anomalous, or potentially anomalous, were re-analyzed. Minimal re-analysis of samples obtained from the 2017 Flatbed exploration was required; the few performed, principally required re-analyses of ash content and FSI.

The laboratories used for the 2017 program are recognized across the Canadian coal industry and internationally for their expertise and experience in coal testing and analysis. Birtley subscribes and adheres to Quality Associates International®, LLC's Coal/Coke Quality Conformance Program™ (CQCP™). This is a quality system designed specifically for accreditation of coal and coke laboratories using ASTM, Committee D 05 on Coal and Coke, standards. Dr. David Pearson (of Pearson & Associates) is an Accredited ICCP (International Committee for Coal & Organic Petrography) Petrographer. He is also Canada's representative on ISO/TC27 Working Group 19 (on Coal Petrography), and wrote the section on sample preparation of the new ISO 7404 "Methods for the Petrographic Analysis of Coals". Therefore, it is the opinion of the authors of this report that the sample preparation, security and analytical procedures meet current industry standards.

The analytical methods used by Birtley are shown in Table 11.1.



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Table 11.1 ASTM Procedures (Birtley, 2017)

Parameter	Lab Method
Preparation of Coal Samples	ASTM D 2013
Air Dried Moisture Loss%	ASTM D 3302
Residual Moisture wt%	ASTM D 3173
Ash wt%	ASTM D 3174
Volatile wt%	ASTM D 3175
Sulphur wt%	ASTM D 4239
Specific Gravity	ISO 1014 (modified)
Free Swelling Index	ASTM D 720
Sieve Analysis	ASTM D 4749
Washability (Float Sink)	ASTM D 4371
Froth Flotation	ASTM D 5114

The laboratory sample preparation and analytical procedures followed for HQ-size core used for 2017 core analyses are summarized below. In addition to the coal seams, a number of seam roof and floor coaly zones also underwent testing and analysis; the testing of these coaly zones were often less comprehensive than the coal seams. Laboratory procedures were as follows:

- All ply samples were air-dried and crushed to -9.5mm; retains were re-crushed until 100% passed the 9.5mm screen. One-eighth by weight was taken for preliminary tests and for subsequent head raw analysis (if required), while the remainder was retained for float-sink (washability) tests and succeeding analyses.
- Initial analyses were then performed on both coal and rock ply samples. For coal plies, these included: as received moisture %, and, on an air-dried basis, Proximate analysis (moisture %, ash %, volatiles %, fixed carbon %), total sulphur (S) %, FSI and specific gravity (SG). Rock samples either underwent the same set of analyses or an abbreviated set that included: as received moisture (%), and, on an air-dried basis, moisture%, ash%, S% and SG.
- Selected coal seam and certain coaly zone ply samples were proportionally combined (by weight), using the retained ($\frac{7}{8}$) fraction, to form a seam composite.
- Head raw analysis comprising air-dried Proximate, S%, SG & FSI was performed on each seam composite.
- The composites were divided into two screen size fractions. These were 9.5mm x 0.25mm and 0.25mm x 0. Screen sizing analysis (on an air-dried basis) was run for each size fraction, where weight, ash%, S% and FSI were determined.
- Float-sink tests were conducted for the 9.5mm x 0.25mm size fraction using the following SG: 1.30, 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.70 and 1.80 to test general washability characteristics and to target a particular washed ash content. The 0.25mm x 0 size fraction underwent time-limited froth flotation process using a Wemco flotation machine with speed of 1200 rpm. Flotation tests were performed for specified times at 30-, 60-, and 90-second intervals, using kerosene and Methyl Isobutyl Carbinol (MIBC) as reagents, and at 5% - 10% pulp density. The pulps went through a conditioning time of one minute before skimming.
- For each float-sink and froth/ tail, weight, Proximate and FSI analyses were completed.



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Sample Preparation, Analysis, and Security

- CCCs were generated by compositing float and froth products primarily targeting ash contents in the 8% - 9% range, but also taking into account yield and FSI values. For the 9.5mm x 0.25mm material, floats were selected over the 1.45 to 1.60 SG range. Apart from one CCC (Seam B, FD17-01) for the 0.25mm x 0 fraction, froths were selected using the 60-seconds frothing time for all seams that returned enough material to have a froth performed. For the CCC of Seam B from FD17-01, a 30 second froth time was used.
- Most CCCs were subjected to the following tests: Proximate analysis, S%, FSI, Hardgrove Index (HGI), Calorific Value, % phosphorous-in-coal, Ultimate Analysis, Gieseler Fluidity, Ruhr dilatation, mineral analysis of ash, carbon forms, As, Hg and F. Split samples taken from the CCCs were submitted for petrographic analysis. Due to sample size or elevated ash contents, some samples may not have undergone all of the analyses listed above.

11.3 SECURITY

Special security measures are not commonly employed for coal projects due to the low-value nature of the commodity. Concerns that pertain to sample security are typically directed towards proper bagging and labeling for shipping and proper handling procedures and storage at the laboratory to ensure no “mix-up” occurs between samples and sample tags.

Sample tracking sheets were completed for each set of samples sent to the laboratory. The information recorded on sample tracking sheets included which samples were sent, the date the samples were shipped and the sample numbers received by the laboratory and date of receipt. No samples were lost. These measures are common within the coal industry and are considered adequate for the secure delivery and storage of coal samples.



Data Verification

12.0 DATA VERIFICATION

The author, Mr. D. J. Loveday (P.Geo.) an independent QP, Stantec Project Manager and representative, has reviewed and verified Colonial's coal exploration methods and data used for developing an independent coal resource estimate for the Flatbed Property. The following data verification methods were employed.

12.1 SITE INSPECTION

A site inspection of the Flatbed Property and nearby core logging facilities at Tumbler Ridge was completed by the QP between October 10 and October 13, 2017. The site inspection included the following:

- A helicopter flight over the property
- location check of Colonial's exploration drillhole locations via handheld GPS
- mapping along Gordon Creek to verify regional strike and overburden formations
- viewing coal seam intervals in the core boxes
- verifying bed orientation in drill core samples
- viewing Boulder Creek Formation-Shaftesbury Formation contact zone, a significant marker horizon, in drill cores and geophysical logs
- reviewing core logging procedures
- reviewing core sampling procedures
- reviewing geophysical log picking procedures
- reviewing electronic data collection procedures.

Further meetings were held both at Colonial's offices and remotely to review and discuss seismic survey data (purchased by Colonial from an existing data set), drilling results, geologic interpretation and exploration strategy.

Subsequent to the above site inspections, the QP and author (Mr. D. J. Loveday), now a representative of Stantec, has observed public records of recent aerial photographs and land development activity including O&G exploration. Observations of these public records have not identified any material change in the physical environment of the property that would represent a material change from those observations undertaken by the author in 2017.

12.2 DATABASE VALIDATION

The exploration database provided to Norwest for independent geologic modeling and resource estimation included the following checks:

- Cross-validation of coal, rock and marker bed intervals against field geologist's logs and assay certificates.
- Comparisons between assay certificate results and provided coal assay database ultimately used for coal quality evaluation and resource estimation.
- Checks for outliers and overlapping intervals in the provided drillhole and coal quality data used for resource modeling and estimation.
- Comparison of drillhole collar survey data against surface topography elevation data and drillhole locality plans provided by Colonial.



13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

All Gordon Creek 2017 coal quality and coal washability testing was conducted using samples taken from HQ-size drill core. Coal quality testing was completed at Birtley located in Calgary, Alberta.

13.1 RAW COAL QUALITY

A total of 93 ply samples covering coal, rock partings and immediate seam roof and floor intervals were analysed on a raw basis at Birtley. All coal and coal zone plies were analysed for the following parameters: Proximate analysis (i.e., moisture %, ash %, volatiles %, fixed carbon %), total sulphur (S) %, FSI and specific gravity (SG). In-seam rock partings plus roof and floor rock samples were either analysed for the same parameters or may have had volatile content determinations omitted. The testing standards used by Birtley for the above raw coal parameters are presented in Section 11.

Coal and rock ply samples came from drillholes FD17-01 and FD17-03A. Samples from FD17-03A were limited to Seam B and the upper section of Seam D only, due to drilling complications that prevented the drillhole from penetrating the remaining Gates Formation coal seams. Composite raw coal quality results (derived from weight averaging individual seam ply data) for each coal seam fully penetrated by drillholes FD17-01 and FD17-03A are presented in Table 13.1, below. The raw coal quality results include adjustments for core loss intervals using the analytical results from the same seam either from adjacent drillholes or other, within-seam, sample plies that displayed a similar geophysical log signature. The impact of these corrections is understood by the QP to have non-material impact on the accuracy of the raw coal quality analytical results presented in Table 13.1.

Table 13.1 Gordon Creek Raw Coal Quality – Air Dried Basis (adb)

Seam ID	Core Recovery (%)	Moisture (%)	Ash (%)	Volatiles (%)	Fixed Carbon (%)	Sulphur (%)	Dmmf Volatiles (%)	Coal Rank (ASTM)
B*	83	0.71	32.57	20.08	46.63	0.90	26.90	mvb
D	68	0.57	19.74	22.47	57.22	0.98	26.43	mvb
E	83	0.58	14.98	21.78	62.66	1.44	24.26	mvb
F1	100	0.31	22.83	19.85	57.01	0.45	23.86	mvb
F2	100	0.55	15.85	20.40	63.20	0.35	23.12	mvb
G	78	0.62	33.48	16.22	49.68	0.47	21.21	lvb
J	99	0.64	17.99	17.40	63.97	0.32	19.85	lvb
K	53	0.77	24.35	15.70	59.18	0.35	18.71	lvb

Notes: * weighted average of FD17-01 and FD17-03A

i) dmmf = dry mineral matter free; ii) mvb = medium volatile bituminous; iii) lvb = low volatile bituminous

Volatile matter on a dmmf basis ranges from 18.71% to 26.90% indicating that the coal seams range in rank from low volatile bituminous (lvb) to medium volatile bituminous (mvb), according to ASTM coal rank classification (Standard D388). Seam G is situated close to the division between these two ranks, which is placed at a dmmf volatile content of 22%.



13.2 CLEAN COAL COMPOSITES

The methods used for laboratory sample preparation and analytical procedures are provided in Section 11.2. The coarse fractions (9.5mm x 2.5mm) from each of the coal seams ranged from 95.89% to 98.31%, with all but one sample being 97.11% or greater. These fractions underwent float-sink testing using some or all of the following densities: 1.30, 1.35, 1.40, 1.45, 1.50, 1.55, 1.60, 1.70, and 1.80. For the residual amounts of each sample that reported to the fine fraction (less than 0.25mm), froth flotation test were conducted at 30-, 60- and 90-seconds (except for Seams D and E for which there were insufficient fines fractions for testing).

The CCCs for each coal seam were generated by compositing float and froth products primarily targeting ash contents in the 8% - 9% range, but also taking into account yield and FSI values; various analytical results obtained from these CCCs are summarized in Tables 13.2 and 13.3, below.

The values for Seam B represent weighted averages of the coal quality data for each of the individual Seam B intercepts from drillholes FD17-01 and FD17-03A. The theoretical yields include adjustments for core loss determined by as ratios of lost coal versus recovered coal and lost rock versus recovered rock, applying that ratio to the float-sink weights for each SG fraction, calculating the increase in weight for each fraction and determining the adjusted theoretical yields. In so doing, all lost rock intervals were assumed to have a 0% yield while all lost coal intervals were assumed to have the same yields as the recovered coal; this was confirmed by visual comparison of recovered and lost core intervals with the detailed geophysical log profiles. The impact of these adjustments is understood by the QP to have a non-material impact on the accuracy of the washed coking coal estimates presented below.



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Table 13.2 Gordon Creek Clean Coal Composite Quality

Seam	Clean Coal								RoMax	Gieseler Fluidity Max DDPM	Dilatation % S.D. 2.5	Base/Acid Ratio	HGI	CV (Cal/g, adb)
	Cut-Point		Clean Coal Composite Analysis											
	SG	Froth (sec)	Moist% (adb)	Ash% (adb)	VM% (adb)	S% (adb)	FSI	%P in Coal (db)						
B*	1.50-1.55	30-60	0.51	8.85	25.04	0.92	8.5	0.081	1.19	1140	117	0.22	77	7800
D	1.45	NSS	0.53	8.37	25.08	0.82	6.0	0.050	1.17	1120	78	0.10	73	7909
E	1.50	NSS	0.56	8.16	22.58	1.32	8.0	0.041	1.29	286	64	0.11	79	7960
F1	1.50	60	0.50	8.58	21.92	0.58	8.0	0.058	1.32	35	28	0.13	84	7898
F2	1.60	60	0.43	8.27	21.27	0.39	7.0	0.046	1.32	4.4	-13	0.22	82	7889
G	1.50	60	0.46	7.93	20.64	0.53	8.0	0.089	1.39	26	17	0.08	84	7946
J	1.55	60	0.44	8.45	18.40	0.37	3.5	0.020	1.43	1.0	-	0.10	80	7913
K	1.50	60	0.52	6.01	18.14	0.41	3.5	0.002	1.43	1.7	-	0.10	79	8138

* Weighted average of FD17-01 and FD17-03A
 i) FSI rounded to the nearest half-unit.; ii) NSS = not sufficient sample



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Table 13.3 Gordon Creek Clean Coal Composite Ultimate Analyses

Seam	Moist% (adb)	C% (adb)	H% (adb)	N% (adb)	S% (adb)	Ash% (adb)	O% (bd)
B*	0.49	79.73	4.52	1.18	0.89	8.88	4.31
D	0.53	80.80	4.52	0.99	0.82	8.37	3.97
E	0.56	80.86	4.40	1.10	1.32	8.16	3.60
F1	0.50	80.87	4.38	1.08	0.58	8.58	4.01
F2	0.43	81.75	4.23	1.05	0.39	8.27	3.88
G	0.46	82.18	4.44	1.13	0.53	7.93	3.33
J	0.44	82.16	4.16	1.01	0.37	8.45	3.41
K	0.52	84.59	4.18	0.98	0.41	6.01	3.31

* weighted average of FD17-01 and FD17-03A

i) adb = air dried basis; ii) bd = by difference

Gordon Creek coal seams typically clean to a low sulphur product. Overall, CCC sulphur contents range between 0.37% and 1.32%. However, with the exception of Seam E (1.32%), all other CCCs returned sulphur contents of less than 1.00%. The mineral analysis of ash provides acid and base oxides contained in the ash. For coke making purposes, minimal basic components are desired. The ash basicity can be reported using a ratio of the base oxides over the acid oxides:

$$\text{Base/Acid} = (\text{CaO} + \text{MgO} + \text{Fe}_2\text{O}_3 + \text{K}_2\text{O} + \text{Na}_2\text{O}) / (\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{TiO}_2)$$

Overall CCC base/acid ratios range from 0.08 to 0.23, although the majority returned base/acid ratios of less than 0.13.

The phosphorus-in-coal contents for all CCCs range from 0.002% to 0.089%.

Rheological characteristics of the Gordon Creek coal seams are as follows; FSI values range from 3.5 to 8.5, although the majority are equal to, or greater than, 6; maximum fluidity values range between 1 and 1,162 ddpm; dilatation ranges from negative 13 to positive 122.

RoMax values range from 1.17 for Seam D, to 1.43 for Seams J and K.

The coal quality results from drill core samples indicate the Gates coal seams in the Gordon Creek area, as presented above, have coking properties after beneficiation. However, while Seam J and Seam K products coals could be considered for use as coking coals, their low values for coal rheology work against this, and they have been viewed in subsequent sections of this report as premium low volatile PCI coals.

13.3 PROJECTED PREPARATION PLANT YIELDS

Table 13.4 below lists the theoretical plant yields for the Gordon Creek coal seams that are directly associated with the CCC coal quality outlined in Tables 13.2 and 13.3. Theoretical plant yields are adjusted for core loss as described in Section 13.2 and do not include losses due to coal handling and near cut-point density material. These losses can be accounted for by applying a practical washing factor (PWF) to each seam based on observation of the ash-yield



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curves for impacts of near density material, as well as type and quantity of out-of-seam dilution (OSD) likely to be delivered to the plant as part of the ROM coal. The practical washing factor for each seam is presented in Table 13.4. A practical washing factor is not listed for Seam E due to seam separation restrictions between Seam E and the top of Seam F1 that limits the choice of extractable coal to the F1 plus F2 seam package (referred to as Zone F).

The projected practical yields outlined in Table 13.4 are derived by the multiplication of PWF and theoretical yield and are presented with and without OSD as determined from the mining method described in Section 16. Seams F1 and F2 (Zone F) are mined together where possible in the proposed mine plan and the OSD for this seam package, called Zone F, includes the rock parting separating Seam F1 and Seam F2 where these two seams are mined together. The significantly lower practical yields for Zone F compared to the theoretical yields for Seam F1 and Seam F2 shown in Table 13.4 are due to the inclusion of the F1-F2 rock parting as additional OSD in the ROM feed from Zone F to the plant.

Table 13.4 Clean Coal Theoretical and Practical Yields

Seam	Cut-Point		Clean Coal Yield			
	S.G.	Froth (sec)	Theoretical Yield (%)	Practical Washing Factor	Practical Yield %	
					Excluding OSD	Including OSD
B ¹	1.50-1.55	30-60	59.12	0.93	55.0	50.5
D	1.45	NSS ²	59.54	0.93	55.3	51.2
E ³	1.5	NSS ²	80.72	-	-	-
F1	1.5	60	62.78	0.90	56.5	44.7
F2	1.6	60	83.32	0.90	75.0	
G	1.5	60	51.59	0.90	46.5	41.9
J	1.55	60	79.56	0.93	74.0	66.4
K	1.5	60	65.88	0.96	63.3	56.2

¹Weighted Average of FD17-01 and FD17-03A;

²NSS = not sufficient sample.

³Not in PEA mine plan - practical yields not considered.

13.4 POTENTIAL LIFE-OF-MINE COAL PRODUCT

The individual coal seams of the Gordon Creek deposit are expected to produce a range of hard coking coals, semi-hard coking coals, and depending on the best available price, semi-soft coking or PCI coals. A detailed discussion of these coal types is presented in Section 19, together with long term coal price estimates that have been used for the PEA.

In summary, Seams D and G are expected to produce hard coking coals that exhibit strong coke strength characteristics. Seam D, is of medium volatile rank and is a high fluidity coal while Seam G is a low volatile coal, with a dmmf volatile content that falls close to the low volatile – medium volatile rank boundary; Seam G exhibits low fluidity. While base/acid ratios are attractive, suggesting higher coke strength after reaction (CSR) values, minor penalties would likely be incurred for slightly elevated sulphur (Seams D and G) and phosphorus (Seam G) contents.



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Seams B and Zone F are expected to produce semi-hard coking coals, as they exhibit higher base/acid ratios than Seams D and G. Seam B is a medium volatile coal with a high FSI and very high levels of fluidity and dilatation. Seam B coals would also incur penalties for sulphur and phosphorus contents. Zone F is of medium volatile rank, with dmmf volatiles towards the lower boundary of this classification, and is a low fluidity, low ash, and low sulphur coal.

Seams J and K are low volatile coals with low ash, low sulphur, low phosphorus and high carbon content, which are essential characteristics in determining suitability as PCI coals (Koornhof, 2018). While these coals could be considered for use as semi-soft coking coals, a more sustainable price point is obtained by viewing them as premium low volatile PCI coals.

These potential product coals would be released sequentially, as each seam is mined.



14.0 MINERAL RESOURCE ESTIMATES

14.1 INTRODUCTION

Coal resource estimations for the Gordon Creek area of the Flatbed Property were completed by Norwest (Norwest, 2018a). These coal resources have been categorized as mineable using underground mining methods.

Geological models completed by Norwest used the interpretation of the geology developed by Colonial's geologists, as well as the author.

Norwest provided a senior coal geologist (Mr. D. J. Loveday, now a representative of Stantec, and QP and author of this PEA) to undertake a site visit between October 10 and October 13, 2017 (see Section 12). Subsequent to the site inspection, Mr. Loveday has observed public records of recent aerial photographs and land development activity including O&G exploration. Observations of these public records have not identified any material change in the physical environment of the property that would represent a material change from those observations undertaken by the author in 2017.

Under Mr. Loveday's direct supervision, Norwest completed data validation and reviewed and assisted in Colonial's geological interpretation and formatting of data to support model development. This was followed by Norwest personnel completing a 3D resource model, resource estimation and resource classification. The 3D resource model comprises a 3D-block model compiled using MineSight® and Carlson® software. Mr. Loveday is the Independent QP and co-author of this report and takes responsibility for the resource estimates.

14.2 APPROACH

Resource estimates were completed in accordance with the requirements of NI 43-101, Standards of Disclosure for Mineral Projects (CSA, 2011). The GSC Paper 88-21 "A Standardized Coal Resource/Reserve Reporting System for Canada" (Hughes, et al, 1989) was referred to for the classification, estimation and reporting of coal resources. GSC Paper 88-21 was written in 1988 and is now obsolete with respect to certain technical parameters. This document was used only as a guideline for resource estimation. Total underground mineable resource estimates, using a 1.0m minimum thickness, are: 298.0Mt of in-situ Inferred resources. Resource estimates are rounded to one decimal place.

The following approach was used to estimate the resources in the Gordon Creek area:

- Construct a grid model to form the basis for reporting resources
- Establish the level of geological complexity based on the geological interpretation
- Perform an independent resource estimate using the grid model
- Identify a maximum depth below surface limit for resource estimation
- Use spatial distribution of drillhole data points to classify resource assurance.

14.3 GEOLOGICAL MODEL

The extent of the Gordon Creek deposit grid model is outlined in Table 14.1. The Gordon Creek model extent in relation to the lease boundary can be observed on Figure 14.1 (Section 28, Illustrations).



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Table 14.1 Gordon Creek Deposit Resource Model Parameters

Coordinates	UTM Zone 10 NAD83 Datum			2D Grid Spacing (m)
	Minimum	Maximum	Origin	
Easting (X)	634,200	641,000	634,200	20
Northing (Y)	6,085,500	6,093,300	6,085,500	20
Elevation (m)	-600	1,500	-600	-

The geologic model was compiled using MineSight® and Carlson® software. A grid modeling method was selected based on the observation of the exploration drilling results that indicated a constant, shallow, seam dip for the resource area that did not warrant the application of more complex block modeling methods. MineSight® software was used for the first phase of the grid modeling process due to the software’s advanced 3D viewing capabilities to aid in the structural interpretation and correlations of the coal seams. MineSight® model grid data were later imported into Carlson® software for the reporting of coal resources and to prepare the model for subsequent underground mine planning using Carlson® software, should that be desired in the future. Carlson® software is used extensively throughout North America for coal resource and reserve evaluation.

The modelled structural interpretation for the Gordon Creek area, described in detail in Section 7 of the report, was determined through observation of coal exploration drilling results, O&G well logs, and from regional structural maps compiled by the BC Government geologists (Legun, 2002). The contact between the Shaftesbury and Boulder Creek Formations (SB-contact), located above the Gates Formation that hosts the target coal seams, was used as a reference point from which to interpret the structural trends and depth intervals of the coal beds.

Correlation of the SB-contact, penetrated in three of Colonial’s exploration drillholes (FD17-01, FD17-02 and FD17-03A), was used to define a reference dip plane. Grid estimates of apparent (vertical) thicknesses of coal beds and intervening waste rock were stacked below this reference plane to develop a geologic model comprising grid estimates of seam roof and floor elevations and apparent thickness. To complete the model, grid estimates of the surface topography, derived from public domain topographic surveys and depth of unconsolidated overburden, measured from exploration drillholes, were also added.

Eight (8) Gates Formation coal seams were identified in the geologic model as having reasonable prospects for eventual economic extraction. These are, from top to bottom, Seams B, D, E, F1, F2, G, J and K. The relative location of these coal seams within the Gates Formation can be viewed in Figure 7.1. The coal seams within the defined resource area are dipping towards the southwest (striking northwest) at 11°. Structure contour maps for the two confining coal seams, Seam B and Seam K are shown on Figures 7.6 and 7.7.

A major resource-limiting fault, called the Flatbed fault, has been identified from drillhole and O&G well logs. The fault follows regional structural trends and strikes northwest. The displacement along the Flatbed fault is estimated to be approximately 1,200m, downthrown towards the northeast. In the southeast of the Gordon Creek area the Flatbed fault is interpreted to develop a north-northwest orientated split. The location of the Flatbed fault and associated fault split is shown in Figures 7.6 and 7.7.



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There is insufficient exploration data to determine the orientation of the Flatbed fault at depth however, exploration and mining in the region has shown major faults to have a near vertical orientation near surface. Given the available information, the resource-limiting Flatbed fault is interpreted to be vertical. A southwest oriented geologic cross-section illustrating the impact of the Flatbed fault on the coal seams can be observed in Figure 7.8. There are no other resource limiting faults identified in the Gordon Creek area.

14.4 BASIS FOR RESOURCE DETERMINATION

NI 43-101 (CSA, 2011) specifies that the definitions of the CIM Guidelines be used for the identification of resources. The CIM Resource and Reserve Definition Committee produced the following statement:

“Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.”

The CIM Definition of Resources is as follows:

“A Mineral Resource is a concentration or occurrence of material of economic interest in or on the Earth’s crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.”

“Material of economic interest refers to diamonds, natural inorganic material, or natural fossilized organic material including base and precious metals, coal, and industrial minerals.”

The committee went on to state the following:

“The term Mineral Resource covers mineralization and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of technical, economic, legal, environmental, socio-economic and governmental factors. The phrase ‘reasonable prospects for eventual economic extraction’ implies a judgment by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction. Interpretation of the word ‘eventual’ in this context may vary depending on the commodity or mineral involved. For example, for some coal, iron, potash deposits and other bulk minerals or commodities, it may be reasonable to envisage ‘eventual economic extraction’ as covering time periods in excess of 50 years. However, for many gold deposits, application of the concept would normally be restricted to perhaps 10 to 15 years, and frequently to much shorter periods of time.”

These definitions and statements clearly show that coal material can only be considered a resource if there is a clear identification of the economic potential of the deposit. For coal deposits, this means that the nature of the database, technology for mining and mine planning, some degree of practical recovery constraints and the economic potential in current markets have to be considered in order to identify a coal resource, and while the strict conditions for the definition of a reserve may not be needed to identify a resource, consideration should still be given to the same key issues.



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14.5 CLASSIFICATION

Reserves and resources are classified according to the confidence level that can be placed in each estimate. In accordance with the criteria of the CIM Guidelines applying to coal deposits, resources are classified in Measured, Indicated and Inferred categories, proceeding from that with the highest confidence level to the lowest. Besides the reserve and resource classification scheme of the CIM Guidelines, NI 43-101 (CSA, 2011) suggests that the criteria of GSC Paper 88-21 (Hughes, et al, 1989) be referred to if necessary. The distinction between different classes of resources in that paper is based on the spacing of valid data points which, in this case, are coal seams intersected by drillholes. The concept is that the closer the drillholes are spaced, the higher the confidence that can be placed in the resource estimate.

GSC Paper 88-21 also utilizes criteria adapted to reflect the differing assurance levels associated with varying levels of geologic complexity. Four levels of increasing geologic complexity are addressed and include:

- Low
- Moderate
- Complex
- Severe.

The interpretation of the Geology Type for the Gordon Creek area of the Flatbed Property is Moderate. GSC Paper 88-21 describes Moderate Geology Type as: "characterised by homoclines or broad open folds (wavelength greater than 1.5km) with bedding inclinations generally less than 30°. Faults may be present, but are relatively uncommon and generally have displacements of less than ten metres."

14.6 COAL RESOURCE ESTIMATE

The term "resource" is utilized to quantify coal contained in seams occurring within specified limits of thickness and depth from surface. The resource estimations contained herein are on a geological in-situ basis, i.e. as an in-situ tonnage and not adjusted for mining losses or dilution. However, minimum mineable seam thickness and maximum removable parting thickness are considered. Coal intervals not meeting these criteria are not included in the resource estimates.

Table 14.2 shows the criteria used for coal resource estimates for the Gordon Creek deposit of the Flatbed Property.

Table 14.2 Gordon Creek Deposit Coal Resource Estimation Criteria

Underground Resources	
Maximum depth from surface	900m
Minimum seam thickness	1.0m
Maximum mineable parting thickness	0.5m

Coal resource estimates as reported from the grid model for the Gordon Creek area are summarized in Table 14.3. Resources are estimated for underground deposit types only. As there has been no material changes that affect the properties coal resource estimate of January 10, 2018, the current resources are deemed to have the same effective date as the PEA, November 12, 2018. Using ASTM criteria, coal rank varies from medium volatile bituminous (mvb)



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to low volatile bituminous (lvb). Coal quality and washability test results described in Section 13 indicate that the coal has coking properties after beneficiation.

Table 14.3 Gordon Creek Deposit In-Place Inferred Coal Resource Estimate

(Effective Date: January 10, 2018)					
Seam ID	Thickness m	Coal Rank	Volume m³000	Density (SG) GSC 88-21	Resource Mt
B	2.93	mvb	32,400	1.61	52.2
D	2.45	mvb	24,564	1.49	36.6
E	1.40	mvb	13,295	1.44	19.1
F1	1.48	mvb	13,795	1.52	21.0
F2	3.67	mvb	33,960	1.45	49.2
G	2.40	lvb	21,512	1.62	34.8
J	4.40	lvb	36,881	1.47	54.2
K	2.56	lvb	20,223	1.53	30.9
				Total	298.0

Specific gravity used for coal tonnage estimates outlined in Table 14.3 were derived using GSC Paper 88-21's Table 1 (in-situ bulk density guidelines) in conjunction with the raw ash estimates outlined in Table 13.1 in Section 13.

The plan view surface footprint of the resource area is depicted in Figures 14.1. The areas of resource assurance were delineated using the distance from data point guidelines in GSC Paper 88-21 that defines an Inferred resource of Moderate geology type to be between 900m and 2,400m from the nearest data point. For the Gordon Creek deposit, the distance from data point varied relative to the quality of the available information from each coal seam penetration. The distance surrounding coal seam penetrations in drillhole FD17-01 was extended to the maximum range of 2,400m on account of the high-quality data acquired from the drillhole, notably high-resolution geophysical log signatures, detailed drill core descriptions and a comprehensive suite of coal assay test results. Seam penetrations around drillhole FD17-03A, as well as O&G wells B-030-K and B-029-K were limited to 1,650m, half the distance between 900m and 2,400m. This shorter range was applied due to the lower resolution geophysical log signatures acquired from the O&G wells and incomplete penetration of the target coal seams from drillhole FD17-03A due to drilling complications.

The accuracy of resource estimates is, in part, a function of the quality and quantity of available data and of engineering and geological interpretation and judgment. Given the data available at the time this report was prepared, the estimates presented herein are considered reasonable. However, they should be accepted with the understanding that additional data and analyses available after the date of the estimates may necessitate revision. These revisions may be material. There is no guarantee that all or any part of the estimated resources will be recoverable.



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Mineral resources are not mineral reserves and there is no assurance that any mineral resources will ultimately be reclassified as proven or probable reserves. Mineral resources which are not mineral reserves do not have demonstrated economic viability.



15.0 MINERAL RESERVE ESTIMATES

This report summarizes the findings of a PEA, which includes Inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the PEA will be realized. No economically recoverable reserves have been defined in this study.



16.0 MINING METHODS

The classification of resources under NI 43-101 (CSA, 2011) and GSC Paper 88-21 (Hughes, et al, 1989) requires that the mining method being considered be defined. The Gordon Creek resource has been defined based on underground mining methods. Historically, underground mining methods have been employed at a number of operations within the western Canadian Rocky Mountain Foothills. These include mines located in west-central Alberta, at Grande Cache and Canmore, and at a number of mines located in the southwestern Alberta - southeastern BC foothills region.

No underground coal mining has taken place in the immediate vicinity of the Flatbed Property, although two proposed longwall mines, one at Murray River and another at Sukunka, are at an advanced stage of planning and development (Stantec, 2013). It is expected that methods of mining similar to those currently proposed for these projects, or methods successfully employed in similar regions mentioned previously, would be appropriate for the Flatbed Property.

16.1 MINING METHOD SELECTION

Two mining methods were investigated; room and pillar, and longwall. After a preliminary analysis, the longwall mining method is expected to provide higher productivity and higher recovery of the resource over the ranges of depths and coal seam thicknesses of the mineable areas. Additionally, the longwall method can better manage the 11° slope gradients currently projected in the resource area. The longwall method for the multiple seam Gordon Creek Project is projected to be economic in the current and forecasted metallurgical coal markets. The proposed mine area is shown in Figure 16.1 and layouts of the longwall operations are illustrated in Figures 16.2 through 16.7 (Section 28, Illustrations).

Longwall mining, in general, has broad applications throughout the world. Its most productive setting is in coal seams of moderate thickness (up to 6m), fairly uniform structure, and simple geology (i.e., minimal faulting or channeling, shallow dips and moderate overburden). Longwalls operate in a wide variety of ground conditions or strength of materials, and in settings much more difficult than those that appear to be exhibited by the Flatbed Property. Where adverse conditions are encountered, longwall productivity is reduced but there are significant amounts of coal that would otherwise be unrecoverable when considering other mining methods that depend on additional coal pillars for support. Longwall equipment is relatively inflexible to radical changes in seam conditions; adequate and timely drilling is required for a successful longwall operation, thereby allowing mine plan adjustments ahead of longwall panel development. Detailed mine mapping and drilling help mitigate adverse impacts on productivity of the longwall.

16.2 GEOLOGICAL CONSIDERATIONS

The geologic factors considered during mine design include:

- Coal seam thickness
- Depth of cover (overburden)
- Coal seam dip
- Roof and floor characteristics



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- Methane liberation
- Groundwater inflow.

The thicknesses of the coal seams at Gordon Creek range from a minimum of 1.2m (Seam E) to a maximum thickness of 5.4m (Seam J). Mineable resource areas were defined using a minimum seam thickness of 2.0m. The F1 and F2 seams were combined into a single mineable horizon (referred to as Zone F), which included the F1-F2 parting (interburden), to maximize resource recovery. The seams selected as having potentially extractable resources all averaged 2.5m and above in thickness.

Table 16.1 summarizes the coal seam thickness within each selected potentially mineable coal seam.

Table 16.1 Potentially Mineable Resource Coal Thickness Summary

Seam/Zone	Coal		
	Average Thickness	Minimum Thickness	Maximum Thickness
	(m)	(m)	(m)
B	3.02	2.05	3.76
D	2.50	2.32	2.70
F	5.26	3.90	6.25
G	2.90	2.58	3.22
J	4.47	3.44	5.40
K	2.61	2.00	3.23

Depth of cover influences the percentage of coal resources recovered. As mining depth increases, larger coal pillars must be left in place to support the mining areas. The potentially extractable resources were defined using a maximum depth of 900m. Table 16.2 summarizes the depth of cover for each of the seams with potentially mineable resources.

Table 16.2 Potentially Mineable Resource Depth of Cover Summary

Seam/Zone	Overburden		
	Average Depth	Minimum Depth	Maximum Depth
	(m)	(m)	(m)
B	624.18	367.80	900
D	671.33	434.18	900
F	687.19	461.04	900
G	788.60	648.23	900
J	723.94	524.79	900
K	745.11	558.68	900



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Seam E is not included in Table 16.1 and Table 16.2 above due to being too thin to mine effectively and/or because the thickness of interburden between it and the roof of Zone F was less than 15m. The extraction of Zone F was given priority over that of Seam E. Additionally, the mineable area for Seam G was also significantly reduced due to the thickness of interburden between it and Zone F being less than 15m. Again, extraction of Zone F was given priority over Seam G. In addition, Seam G contains a large area of resources under 2m thickness.

Coal seam dip influences the layout orientation and the equipment selection for the identified mining areas. An overall dip of 11° has been identified in the mining areas and a limited number of holes has not identified any significant anomalies in the projected gradient. The mine layouts project the main development entries down-dip with the longwall gate roads projected at or very near strike. The projected gradient is manageable with track mounted and modified rubber-tired equipment.

Seam roof and floor characteristics identified through analysis of the drill core descriptions and geotechnical sampling and testing indicate that the roof conditions of Seams B, D, F1, F2 and K are fair to good and that those of Seams G and J are poor to fair (Norwest, 2018b). Methane liberation rates for the Gordon Creek Project have not been measured. Methane gas desorption rates and volumes considered to be typical of this region of the Rocky Mountain Foothills have been used for the purposes of this study. Groundwater inflow information was not available for review. However, mining operations in these seams are expected to incur water inflow. Water bearing strata within the first 100m above Seam B may be encountered. Pumping systems, sumps, and discharge piping systems would be required to manage water in the active operating areas.

16.3 GEOTECHNICAL CONSIDERATIONS

16.3.1 Pillar and Gate Road Design

Stantec evaluated multiple main entry scenarios at multiple roadway dimensions selecting a six-roadway configuration with openings standardized at 2.5m height and 15.5m widths to determine the pillar sizing. The pillars in mains are not stacked from seam to seam to reduce columnar pressures.

Stantec evaluated three-entry gate roads with equal-sized pillars, yield-abutment configurations, and two-entry configurations. The yield abutment was selected for this study over the two-entry due to a regulatory concern that the two-entry system may not be accepted. The gate road placement for multiple seam mining is to place the gates in the next lower seam in the shadow of the destressed longwall cave.

Mains pillar stability design was conducted using an industry standard program developed by the National Institute for Occupational Safety and Health (NIOSH) in the United States (U.S.). The stability program “Analysis of Retreat Mining Pillar Stability” (ARMPS) calculates stability factors based on estimates of the loads applied to, and the load bearing capacities of, pillars during the development and retreat mining operations. The ARMPS program uses a default coal strength of 6.2 Megapascals (MPa) determined from historical analysis throughout U.S. coal mines. Gate road stability design was also conducted using an industry standard program developed by NIOSH in the U.S.



Mining Methods

16.3.2 Multiple Seam Mining

Stantec projects multiple seam mining for the Gordon Creek deposit. Multiple-seam potentially mineable resources have been delineated using a minimum seam interburden thickness of 15m. Greater interburden between planned mining areas improves the probability of successful multiple seam mining. The projected interburden summary is presented in Table 16.3 showing the maximum, minimum, and average interburden thickness for each of the potential mineable areas. Seam G is only potentially mineable in areas where the interburden thickness exceeds 15m below Zone F. The areas of Seam G where the interburden thickness is less than 15m are not considered mineable. Within such areas, Table 16.3 reflects the interburden thickness between Zone F and Seam J.

Table 16.3 Potentially Mineable Resource Interburden Thickness Summary

Seam/Zone	Interburden		
	Average Thickness	Minimum Thickness	Maximum Thickness
	(m)	(m)	(m)
B - D	66.17	64.23	68.23
D - F	28.86	23.20	34.65
F - G	16.27	15.00	17.81
F - J	47.10	39.88	54.05
G - J	27.93	22.30	33.02
J - K	26.29	22.71	30.00

Table 16.4 presents a listing of the geologic and mining factors which should be considered for multiple seam mining, all of which require detailed investigation.



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Table 16.4 Geologic and Mining Factors Applicable to Multiple Seam Mine Design

Geological Factor	Mining Factor
In-situ horizontal stress conditions	Sequence of mining
Overburden thickness and rock type	Mining method
Upper seam thickness	Installed mining support
Lower seam thickness	Mining layout and dimensions
Upper seam immediate roof and floor	Extraction percentage of both seams
Lower seam roof and floor	Relative location and orientation of upper and lower workings
Interburden thickness and rock type	Mining height
Interburden hard rock percentage	Mining direction
Number of rock layers contained in interburden	Time between mining of upper and lower seams
Coefficient of friction between rock layers	
Seam inclination	
Rock mechanics properties of the lower and upper seam coals	
Existence of ground water	
Surface subsidence issues	
Geological anomalies	

(modified from Peng, 2008)

For multiple seam longwall mining, Stantec considered staggering the location of the gate roads in each seam to place the gate road development in the shadow of the overlying longwall caved (gob) area to reduce the loading. The longwall gate road would then only face higher stresses when development passed under the perimeter of the overlying gob. Additional primary and secondary ground control measures, along with mining precautions, are likely to be required where development mining is conducted in these abutment stress zones.

16.4 MINE LAYOUT AND MINEABLE RUN-OF-MINE COAL ESTIMATES

Stantec developed potential mine layouts for the mineable areas delineated in the seams with the greatest mining potential. Mining limits were established for all seams based upon seam thickness, seam dip, depth of cover, buffers to faulting, property control boundaries, and interburden thickness. Mining limits were established for each seam, and then mining layouts were delineated based on geotechnical review parameters and on a multiple seam extraction basis.

16.4.1 Mining Limit Parameters

Stantec established mining limit parameters for the seams identified in the 2018 resource report (Norwest, 2018a) to define the extents of potential underground mining in each seam. The potentially mineable resource limits were constrained according to the following parameters:

- Minimum overburden: 50m
- Maximum overburden: 900m
- Minimum interburden: 15m



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- Minimum seam mining thickness: 2.0m
- Maximum grade (dip): 16° or approximately 29%.
- Minimum fault line buffer: 25m
- Minimum outcrop barrier: 100m
- License boundary barrier: 50m.

Six seams were identified as having potentially mineable resources. These were Seams B, D, (Zone) F, G, J, and K. Seam G was the most limited due to interburden thickness between the bottom of Zone F being less than 15m over most of the area, and the coal seam thickness being less than 2m over a significant portion of the identified resource area.

The applicable mining limit boundary and the potential mine plan layout for each seam are presented in Figures 16.2 through 16.7. Within the proposed mine plan layouts, the mineable ROM tonnes have been classified as Inferred using the available geologic information. The amount of ROM tonnes and potential productivity rates are discussed below.

16.4.2 Potential Productivities

For mining productivity calculations Stantec utilizes spreadsheet-based macros that include equipment tramming speed adjustments based on the average gradient changes within the development area. Continuous miner and road header development were modeled in down-dip and along-strike configurations, reviewing six-entry mains and three-entry gate roads and bleeders. The projected pillar sizes and configurations were input into the model for down-dip development in the six-entry mains and for the three-entry yield abutment longwall gate roads and bleeders. Table 16.5 summarizes the results used for the Gordon Creek development productivities.

Table 16.5 Section Productivity Model Results – Summary

Seam/Zone	Method	Orientation	Average Grade	Mining Height	Productivity Results	
					Tonnes/shift	Adv/Shift (m)
All	RH Six-entry Mains	Down-Dip	10.21%	2.5	879	39.3
B	CM Three-entry Yield Abutment	Strike	6.83%	2.5	732	32.9
D	CM Three-entry Yield Abutment	Strike	6.83%	2.5	716	32.0
F	CM Three-entry Yield Abutment	Strike	6.83%	2.5	707	31.7
G	CM Three-entry Yield Abutment	Strike	6.83%	2.5	660	29.6
J	CM Three-entry Yield Abutment	Strike	6.83%	2.5	633	28.3
K	CM Three-entry Yield Abutment	Strike	6.83%	2.5	684	30.8

The longwall productivity model used to project an average daily retreat is based on: the face dimensions, web depth, cutting speed in either direction, face gradient, gate end turn-around times, and face delays. All seams except Zone F, mine within the confines of the stated coal seam. Zone F, which averages an overall thickness of 5.3m, encompasses Seam F1 and F2 and contains a 2.3m average thickness parting. Mining this seam with a single pass system would require special equipment and would also bring face stability safety issues into the mineability. Stantec



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projected the use of rear caving longwall equipment for this seam allowing a more controllable initial pass while collecting the broken interburden and F1 Seam on the rear conveyor. Table 16.6 summarizes the results of the longwall production model used in the longwall productivity evaluation.

Table 16.6 Longwall Productivity Model Results – Summary

Seam/Zone	Average Face Width (m)	Tonnes per Pass	Minutes Per Pass	Productive Minutes per Day	Average Tonnes per Operating Day	Face Retreat per Day (m)
B	274	745.8	57.4	860	11,175	9.1
D	274	576.5	57.4	860	8,638	9.1
F	274	2,022.7	101.7	860	17,107	5.2
G	274	761.7	57.4	860	11,414	9.1
J	274	1,077.2	57.4	860	16,141	9.1
K	274	1,077.2	57.4	860	16,141	9.1

16.5 MINING EQUIPMENT

Development is envisioned to be accomplished with both continuous miner (CM) fleets and a road header (RH) fleet. The CM section fleet is projected to operate shuttle cars, mobile roof bolters, feeder-breakers, and load-haul-dump (LHD) scoops. The CM fleets are projected to be deployed in the longwall gate roads and bleeders, and in the main development areas around shaft bottoms. The RH fleet is projected to operate with two road headers, extendable conveyance, stage loader, pass by bolters, and LHD diesel scoop. Roadway openings are designed to average 5.5m wide and average 2.5m high. Development equipment should be sized to operate at a minimum height of 2.0m. The CM equipment is projected to be sourced through U.S./Canadian suppliers and the RH equipment is projected to be sourced through Canadian/Chinese suppliers.

The longwall face equipment is projected to utilize a double drum shear designed to operate in a cutting range from 2.0m to 4.0m. The face haulage is a chain/flight conveyor oriented to move material down gradient. The face conveyor system will be re-handed when longwall mining progresses from the northern panels to the southern panels to maintain downhill material movement. A face support system with optional rear caving capability provides a second chain conveyor to be installed for Zone F. The face supports would have additional retractable rear canopies that would allow remaining head coal to flow into the trailing (rear) conveyor. Recovery of the uncut head coal is projected to average 80%. The longwall equipment is projected to be sourced through Chinese/Eastern European suppliers.

The rear caving operation proposed for Zone F is projected to recover 90% of Seam F2, 85% of the Zone F parting, and 80% of Seam F1 within the areas of the longwall retreat.

16.6 ROOF CONTROL

Preliminary roof control design requires a baseline of information gathered as part of the drilling program. During the 2017 drilling program, key information necessary to determine the Coal Mine Roof Rating (CMRR), was collected. Norwest now Stantec used geotechnical information collected to classify the roof materials.



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The CMRR classification results from geotechnical core samples for the Gordon Creek deposit are summarized in Table 16.7.

Table 16.7 CMRR Summary – Gordon Creek Deposit

Seam/Zone	Drillhole	Seam Thickness (m)	Roof Depth (m)	CMRR	CMRR (Groundwater Adj.)
B	FD17-01	3.73	657.88	53.9	51.9
D	FD17-01	2.42	727.40	66.0	64.0
F	FD17-01	10.22	762.45	51.3	49.3
G	FD17-01	3.32	790.38	31.8	29.8
J	FD17-01	3.50	816.00	25.9	23.9
K	FD17-01	3.72	841.66	57.5	55.5

Roof control reviews were conducted using the CMRR classification information using another NIOSH software package called “Analysis of Roof Bolt Systems” (ARBS). ARBS provides some insight into the level of support change in twenty CMRR rating points. ARBS was performed on each seam roof at five critical overburden depths (500m, 600m, 700m, 800m, and 900m). Seams with CMRR greater than 49 were reviewed together as were those below a CMRR of 32. Table 16.8 summarizes the ARBS input information and Table 16.9 presents the results.

Table 16.8 ARBS Input Data Summary

Seam/Zone	CMRR	Depth (m)	Roof Bolt Information			Secondary Support		Roadway Parameters	
			Length (m)	Diameter (mm)	Grade (MPa)	Length (m)	Capacity (MN)	Width (m)	Intersection Span (m)
B, D, F, K	50	500	1.83	20	420	N/A	N/A	5.5	9.8
		600							
		700							
		800							
		900							
G	32	500	2.44	20	420	3.3	520	5.5	8.6
		600							
		700							
		800							
		900							
J	26	500	2.7	20	420	3.3	520	5.5	8.2
		600							
		700							
		800							
		900							



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Table 16.9 ARBS Review Results Summary

Depth	CMRR	Primary Bolt Pattern		Secondary Support Intersections	Suggested ARBS Design			Actual Design Support Factor	
		Bolts per Row	Row Spacing (m)		Intersection Span (m)	Bolt Length (m)	Support Factor	Primary	Secondary
				No. Cables					
500	50	4	1.2	12	10.1	1.8	8.8	10	N/A
600							9.4	10	
700							9.5	10	
800							9.9	10	
900		5	1.22				10.2	12.3	
500	32	4	1.2	12	8.6	2.3	16.3	13.4	22.4
600						2.4	16.9	13.4	22.4
700						17.3	13.4	22.4	
800						5	2.5	17.7	16.7
900		18.1	16.7				22.4		
500	26	5	1.2	12	8.2	2.6	19.5	18.5	24.6
600							19.9	18.5	24.6
700						2.7	20.3	18.5	24.6
800							20.7	18.5	24.6
900							20.7	18.5	24.6

Ground control systems projected for these mining layouts in Seams B, D, (Zone) F, G, J, and K are based on planned mining areas with less than 600m overburden and areas with greater than 600m overburden. The roof control supports costs have been developed for two primary development types:

- Multiple roadway mains and bleeders with longer active lifespan
- Longwall gate road development with higher stress and critical ventilation capacity.

Primary bolt lengths range between 1.8 and 2.7m with four to five bolts per row. Support costs for mains, gate roads, and bleeders are developed with a 4 to 5-bolt per row pattern on 1.2m row spacing with roof mesh installed to control immediate roof rock spalling. A standard bolt consisting of 1.8m length, 20mm diameter (#6 bar equivalent) and 420MPa strength is indicated for Seams B, D, (Zone) F, and K. The bolt length for Seams G and J varies between 2.3m to 2.7m. Secondary support using cable bolts is projected in 100% of the intersections with a secondary support system of twelve 3.3m long by 19mm diameter cable bolts. Additional areas of secondary support using cable bolts are projected in 5% of the development roadways in Seams B, D, (Zone) F, and K. The additional areas of secondary support are increased in the weaker roof of Seams G and J to 40% of the developed roadways with less than 600m overburden and 60% of the developed roadways with greater than 600m overburden. Mesh rib support 5m wide with 1.2m anchor bolts are to be installed in areas greater than 2.0m mining height.



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Longwall gate roads are expected to experience higher stresses during their active lifespan. The gate road ground control costs are developed on the development support patterns mentioned above. Additional secondary support is projected to be installed during the retreating cycle of the longwall. Metal cans 0.91m in diameter filled with air-entrained cement will be placed in one roadway and the adjacent cross-cut on the tail gate side, and two roadways and the connecting cross-cut on the head gate side of the active longwall. The spacing and number of cans per row varies based on the seam CMRR and the overburden depth. Seams B, D, (Zone) F, and K are projected to require a single row on 1.8m centres in overburden less than 600m and a double row on 2.4m centres in overburden greater than 600m. Seams G and J are projected to install a double row on 2.4m centres in overburden less than 600m and a double row on 1.8m centres in overburden greater than 600m.

The estimated OSD dilution to the ROM material, given the roof control requirements and mining method, is 0.2m of rock when mining separate coal seams. The OSD rock density used to calculate ROM tonnes when mining individual seams was estimated to be the average rock density reported from laboratory samples of roof and floor rock. Average OSD rock density varied from 2.46 when mining Seam K to 2.06 when mining Seam B. For mining Zone F, all or most OSD is expected to come from 0.2m of F2 Seam floor (averaging 2.18 SG) and also from F1-F2 rock parting (averaging 2.00 SG) when the rock parting is being included in the ROM from longwall mining sections.

16.7 VENTILATION

Methane liberation is expected at Gordon Creek based on the depths of the mineable coal seams. No methane desorption testing has been completed at Gordon Creek. For this mining study methane gas content of 14.5 cc/g with a 15% release during cutting is assumed based on regional Gates Formation gas testing performed on other properties (Lamberson and Bustin, 1993).

The mine ventilation system must dilute the instantaneous methane release during the mining process and any additional methane release from the surrounding strata. Table 16.10 summarizes the projected instantaneous mining rates by type of mining being performed, the liberated methane per minute, and the necessary ventilation volume at the mining face to maintain a 20% lower explosive limit (LEL), or 1% methane by volume, in three scenarios; namely, no drainage; a 25% reduction in liberated methane using some methane drainage; and, a 50% reduction in liberated methane by use of multiple methane drainage methods.



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Table 16.10 Methane Liberation Impact on Face Ventilation Requirements – Summary

Mining Depth (m)	Projected Gas Content (cc/g)	Type of Mining	Mining Rate (tonnes / min)	Percent Liberation	CH ₄ Liberation (m ³ /min)	Projected Face Ventilation to Maintain 20% LEL		
						No Degasification	Degasification 25% CH ₄ Reduction	Degasification 50% CH ₄ Reduction
						(m ³ /sec)	(m ³ /sec)	(m ³ /sec)
500	13.5	CM/RH Development	1.97	15%	4.0	6.6	5.0	3.3
		Seams B, D, G, J, K LW Shearer	13	15%	26.3	43.9	32.9	21.9
		Zone F LW Shearer	34.6	9%	42.5	70.8	53.1	35.4
600	14.3	CM/RH Development	1.97	15%	4.2	7.0	5.3	3.5
		Seams B, D, G, J, K LW Shearer	13	15%	27.9	46.5	34.9	23.2
		Zone F LW Shearer	34.6	9%	45.0	75.0	56.3	37.5
700	14.5	CM/RH Development	1.97	15%	4.3	7.1	5.4	3.6
		Seams B, D, G, J, K LW Shearer	13	15%	28.3	47.1	35.3	23.6
		Zone F LW Shearer	34.6	9%	45.7	76.1	57.1	38.0
800	14.6	CM/RH Development	1.97	15%	4.3	7.2	5.4	3.6
		Seams B, D, G, J, K LW Shearer	13	15%	28.5	47.5	35.6	23.7
		Zone F LW Shearer	34.6	9%	46.0	76.6	57.5	38.3
900	15	CM/RH Development	1.97	15%	4.4	7.4	5.5	3.7
		Seams B, D, G, J, K LW Shearer	13	15%	29.3	48.8	36.6	24.4
		Zone F LW Shearer	34.6	9%	47.2	78.7	59.0	39.4



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Stantec completed a ventilation simulation review of the bottom of Seam K to evaluate the access shaft and decline sizes along with the number of roadways necessary to develop the furthest area from the surface portal (one longwall and two gate road development sections) using VentSim Visual™ software. The initial simulation utilized shaft access to Seam B with two declines and a raise bored return shaft to each of the lower seams. The main development is comprised of two intake roadways, two neutral belt roadways, and two return airways. Roadways were projected at 2.5m height and 15.5m width with a fan system capable of providing 190m³/sec, operating at 2,500Pa and powered by a 629kW (843hp) motor.

16.8 MATERIALS HANDLING

Underground conveyor systems are projected to transport coal from each of the planned seams to a common slope conveyor that connects to all seams except Seam G. Seam G interconnects to Zone F by an additional interseam slope and shafts and the Zone F conveyor system, to reach the slope conveyor. The slope conveyor, the main development conveyor and the longwall conveyor have been projected at 1525mm (60 inches) wide. Conveyors utilized for the development of the gate roads and bleeder systems are projected to be 1220mm (48 inches) wide.

The slope conveyor is projected to be at a 13° incline grade and the connecting mains conveyors are projected to operate on an 11° incline grade. The gate road conveyors are projected at or near the seam strike leading to the conveyors being within a +/- 1° to 2° operating orientation. Longwall setup faces and adjacent bleeder developments are projected on a down-dip 11° grade resulting in the conveyors carrying material up dip

16.9 PRODUCTION SCHEDULE

The annual production of ROM coal from the Gordon Creek Project is based on the operation of two development units, comprised of either two CM fleets or one CM and one RH fleet, and one longwall. The RH fleet is planned to operate primarily in the 11° down-dip developments of the mains and bleeders. Due to the gradient conditions and the multiple seams, production is scheduled for five out of seven days, or 10 shifts per week. A 20% overtime factor has been included to cover potential additional shifts required to maintain production.

Delays are projected for each longwall move of thirty days due to the gradient conditions. This 30-day delay allows for the installation of the longwall drive terminal and the wider belt system, as well as the relocation of the longwall equipment from the end of one panel to the beginning of the next.

Table 16.11 summarizes the ROM tonnes for the seams targeted for mining. Figure 16.8 illustrates the LOM clean coal production schedule per seam and mining zone.



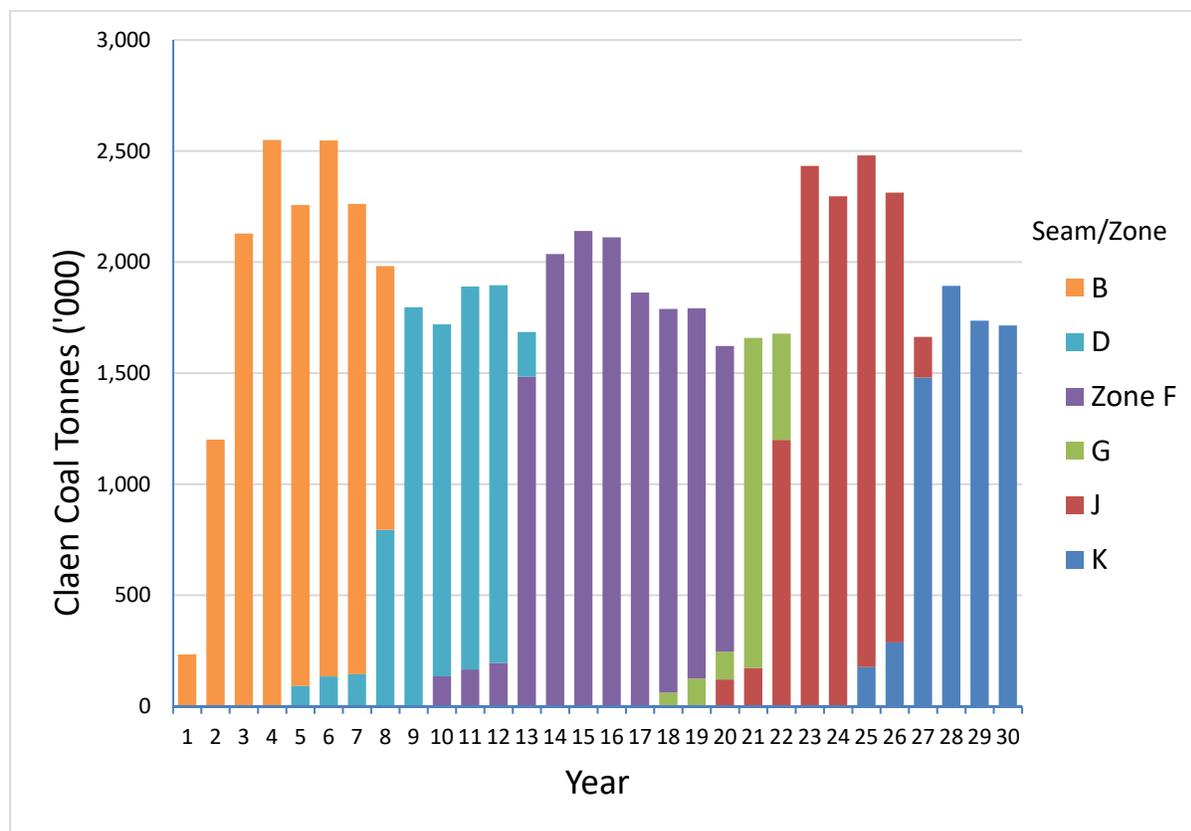
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Table 16.11 Gordon Creek Projected Run-of-Mine Coal Tonnes

Seam/Zone	Mineable MTRC (M)	Mineable Resource Recovery (%)	ROM Coal MTRC (M)	ROM MTRC w/OSD (M)
B	50.6	50	25.4	27.7
D	35.4	42	14.8	15.9
F	68.2	31	21.1	33.3
G	14.7	33	4.9	5.4
J	52.5	28	14.5	16.2
K	30.0	39	11.6	13.1
Total	251.4	37	92.3	111.6

Figure 16.8 Life-of-Mine Clean Coal Production Schedule



17.0 RECOVERY METHODS

Handling and processing of coal typically occurs within the confines of the Coal Handling and Preparation Plant (CHPP) which is located within the plant site area; a possible CHPP location is shown in Figure 16.1. The plant has two components; the Coal Handling Plant (CHP) as well as the CPP. The CHP receives raw coal from the mine(s), sizes it and feeds it to a stockpile or to the washery, or CPP. Clean coal is then typically conveyed and loaded for transportation to port, while refuse from the washing process is loaded for transportation to disposal facilities. The scoping level study summarized in this report included an assessment of CHP and CPP needs that is conceptual in nature and based on a commonly used approach. Detailed designs, flowsheets, energy and water requirements, etc., have not been estimated or prepared.

As noted earlier in the study, coal handling and processing of Gates coal seams have been carried out at the neighboring Quintette, Bullmoose, Trend and Wolverine mines. It is expected that the Gates coal seams of the Gordon Creek deposit would be amenable to processing by similar methods as those utilized at the foregoing, listed, operations. However, a detailed evaluation of coal processing requirements and projected coal recoveries for the Gordon Creek deposit have not been developed as part of this PEA study.

17.1 COAL HANDLING PLANT

For the purposes of this PEA, costs of a CHP have been assumed consistent with the need to handle a maximum of 5.0Mtpa of ROM coal to produce 2.6Mtpa of clean coal. ROM material is typically first transported from underground workings to a ROM stockpile near the CHP. The ROM stockpile allows the CHP to operate somewhat independently of the mine, providing the CHP operations the ability to schedule maintenance without disrupting the mining activity. Reclaim from the ROM stockpile would typically be performed with the use of dozers and pile activators.

17.2 COAL PREPARATION PLANT

The CPP will be required to process an estimated maximum of 5.0Mtpa of ROM coal to produce 2.6Mtpa of clean coal.

Stantec has estimated an overall yield of 51% for washing the various coal seams to a range of 8% to 9% product ash (adb) over the LOM. In general, a CPP for this application would be expected to use a combination of heavy media cyclone, reflux classifiers or spiral concentrators and froth flotation processes to remove high-ash waste from the coal to reduce the product ash to a target level.

After washing, clean coal is stored and covered to ensure that weather doesn't increase the moisture content until shipment, as well as to mitigate blowing coal dust and coal losses. The washing process should optimize mechanical de-watering of the coal to minimize thermal drying requirements. The moisture reduction goal is to offset moisture content increases during rail haulage and stockpiling at the shipping docks during wet weather, in order to achieve an average 9% maximum moisture level once on-board the ship.



18.0 PROJECT INFRASTRUCTURE

On a regional and local basis, the important elements of existing infrastructure are discussed in Sections 4 and 5 above and are shown in Figures 4.1 to 4.4 of this report. In addition to the descriptions presented in Sections 4 and 5, electrical power is available from an existing 230kV powerline terminating at the Quintette project substation, located at the Quintette wash plant area.

There have been no improvements made to the Flatbed Coal Property as of the effective date of this report.

18.1 RAIL LINK

For the purposes of this study, it has been assumed that a 1.8km long spur line will be required to connect the coal load out to the main rail line, proximal to PRC's existing loadout. The proposed rail spur would extend southeast from the existing rail line, adjacent to Heritage Highway (Hwy 52), where a 2.7km rail loop would be constructed to accommodate a unit train. The locations of the rail spur and coal loadout are represented on Figure 18.1 (Section 28, Illustrations). Approximately CAN \$16.6M has been included in the projected capital expense for the rail link.

18.2 RAIL LOADOUT

Coal will be trucked approximately 16.5km from the mine site to the rail loadout and stockpiled, then loaded into rail cars using a unit-train loadout system. The PEA assumes that the truck unloading, stockpile and unit-train loadout system will be included in the capital expense at a cost of approximately CAN \$16.4M.

18.3 ROAD UPGRADE

To provide an access route to transport coal along with materials and supplies between the mine and the Heritage Highway, which is located approximately 8km to the north, the existing unpaved forest service roads will need to be improved. Improvements may include re-grading, repair, re-surfacing, drainage controls, bridging and crossings, and the addition of truck 'turn-outs' (as implemented on logging roads) to improve the safety and efficiency of two-way traffic. The proposed trucking route is illustrated in Figure 18.1. Costs for the upgrade and ongoing maintenance of this haulage road are captured in capital and operating cost estimates.

18.4 POWERLINE

The combined power requirements for the underground mine workings as well as the CHP and CPP will likely exceed what can be practically and economically achieved through the use of generator sets. It is assumed, for the purposes of cost estimation, that a 230kV powerline will be constructed to connect the Flatbed Property to the BC Hydro grid near the Quintette substation, approximately 14km from the proposed area of the Gordon Creek plant site (see Figure 18.1). This study takes into account tying into the existing system as well as the cost of distribution of power throughout the project site.



Project Infrastructure

18.5 SURFACE ANCILLARY FACILITIES

The projected surface support facilities are expected to include the following:

- Mine office
- Mine bath house
- Maintenance shop
- Warehouse
- Coal laboratory
- Fire water storage
- Electrical substation
- Parking areas
- Fueling equipment for mine operations.

Design of the infrastructure has been based on a peak operational staffing of approximately 250 employees and/or subcontractors. The office staff is projected to be approximately 40 employees. The location of the proposed CPP and other main surface facilities is illustrated in Figure 18.1.

18.6 REFUSE HANDLING

Stantec has assumed that the coal process wastes will be a combination of the dewatered coarse coal and fine coal streams. The process wastes will be conveyed to a refuse bin for truck loading then hauled to active waste dumps and blended with waste rock generated from the mine.

18.7 ELECTRIC POWER

The connected electrical load projected for the Gordon Creek Project is approximately 45 Mega Volt Amps (MVA) and includes power requirements for one underground operation consisting of a longwall, CM/RH development equipment, conveyors, pumps, surface fans, and associated infrastructure, shaft hoisting, ROM and clean coal handling, the CPP, mine support facilities, and the train loadout facility. The nominal operating load at full production is projected to be in the range of 15 to 20MVA.

Table 18.1 summarizes the connected MVA for the underground and surface areas of the mine. The underground loads include the CM and longwall equipment, conveyors, surface fans and other underground loads such as water pumps, compressors, rock dusting system, etc. The surface loads include the major loads discussed above and mine support facilities such as the train loadout, bath house, offices, etc.



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Table 18.1 Connected Power Requirement Estimates

Location	MVA
Underground	
CM/RH Equipment	7
LW Equipment	2
Underground Conveyors	11
Surface Fans	3
Other Underground Loads	2
Total Underground	25
Surface	
Hoisting	4
ROM Coal Handling	2
CPP	7
Clean Coal Handling	4
Buildings and Other Surface Facilities	1
Train Loadout/Coal Handling	2
Total Surface	20
Total Surface and Underground	45



19.0 MARKETS AND CONTRACTS

The discussion presented below has been adapted from the document titled "Price Assessment for Flatbed Metallurgical Coal" prepared by Kobie Koornhof Associates Inc. (Koornhof, 2018). The metallurgical coal price outlooks provided below is valid for November 23, 2018.

19.1 QUALITY OF GORDON CREEK DEPOSIT METALLURGICAL COAL

This report is based on individual seam quality provided by Colonial for Seams B, D, (Zone) F, G, J and K of the Gordon Creek Project. All seams can be classified as metallurgical coals suitable for the export market.

19.1.1 Coking Coals

Seams B, D, (Zone) F and G can be used as coking coals in coke oven blends. Table 19.1 compares the quality of Gordon Creek coking coals to Canadian coking coals currently exported from northeast and southeast BC.

Table 19.1 Gordon Creek Coking Coal Compared to Canadian Export Coking Coal

	Gordon Creek Coking Coal ¹		Canadian NEBC HCC ²	Canadian SEBC HCC ²
	Min	Max		
Total Moisture (% as received)	8	9	8 - 9	8
Volatile Matter (% air dry)	20.7	25.2	23 - 24.5	21.0 - 27.0
Ash Content (% air dry)	8.0	8.9	8.25 - 8.6	8.5 - 9.6
Sulphur Content (% air dry)	0.44	0.90	0.45 - 0.55	0.35 - 0.75
Free Swelling Index (FSI)	6	8	7 - 8	6 - 8
Mean Max Reflectance of Vitrinite (%)	1.18	1.39	1.15 - 1.25	1.08 - 1.35
Maximum Fluidity (ddpm)	12	1135	150 - 300	40 - 300
Phosphorus in Coal (% dry)	0.049	0.089	0.008 - 0.040	0.010 - 0.065
Base/Acid Ratio of Ash	0.08	0.22	0.12 - 0.18	0.07 - 0.10
Coke Strength after Reaction (CSR)	51*	70*	58 - 60	68 - 72

Note: * = Calculated; NEBC = Northeast British Columbia; SEBC = Southeast British Columbia

1) Results based on laboratory scale washing and testing of exploration samples.

2) Results based on full washing plant under operating conditions.

19.1.2 Pulverized Injection Coals

Seams J and K are suitable for use as PCI coals; Table 19.2 compares the quality of Gordon Creek PCI coals with quality ranges of low vol PCI coals originating from Queensland, Australia and northeast BC (NEBC).



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Markets and Contracts

Table 19.2 Gordon Creek PCI Coal Compared to Export PCI from Queensland/NEBC

	Gordon Creek PCI Coal ¹		Low Vol PCI from Qld/NEBC ²	
	J	K	Min	Max
Total Moisture (% as received)	8 - 9	8 - 9	8	10.5
Volatile Matter (% air dry)	18.5	18.2	9.5	20.4
Ash Content (% air dry)	8.5	6	7.5	10.5
Sulphur Content (% air dry)	0.37	0.41	0.28	0.70
Free Swelling Index (FSI)	3.5	3.5	0	2
Hardgrove Grindability Index (HGI)	80	79	65	90
Carbon Ultimate DAF %	90	91	88	92
Hydrogen Ultimate DAF %	4.2	4.2	3.6	4.9
Mean Max Reflectance of Vitrinite (%)	1.43	1.43	1.26	1.75
Phosphorus in Coal (% dry)	0.020	0.002	0.030	0.100
Calorific Value (Gross air dry) Kcal/kg	7913	8138	7450	7910
Coke Replacement Ratio*	0.92	0.93	0.87	0.93

Note: * = Calculated; NEBC = Northeast British Columbia

1) Results based on laboratory scale washing and testing of exploration samples.

2) Results based on full washing plant under operating conditions.

19.2 RECENT MARKET OVERVIEW

Over the last 12 months the coking coal market returned to a demand led price cycle, as opposed to the predominantly supply constrained markets of late 2016/early 2017, which had resulted in price spikes above US \$300pt.

Since August 2017, prime HCC has traded in the range US \$175 to US \$230pt, with a minor peak over US \$250 in early January 2018. The driver for the extended price run has been a combination of strong steel fundamentals, increasing demand in all regions, and tighter than usual coking coal supply.

Strong support emerged in mid-2018 for a floor of between US \$165-170pt FOB, with Chinese domestic supplies priced at or above spot prices. Since then, prices have increased due to strong demand, remaining above US \$200 since September. Prices increased further in early October as Chinese buyers returned from the Golden Week holiday, coupled with supply problems out of Australia, highlighted by Peabody's North Goonyella fire outage.

Indian markets have supported the high prices for Queensland prime hard coking coals, backed by a strong steel sector and high coke prices. On the supply side, waiting times have increased at Queensland ports where currently 75 ships are at anchor awaiting loading turn, with 3-week delays for the major export brands.

The average spot price from January to October 2018 was US \$204pt, a 26% increase on the 2017 average of US \$161pt. With a market that is well balanced at the moment (strong demand and no excess of supply), observers expect that prices will remain comfortably above US \$200.00/t FOB, until at least the end of the year.



19.3 STEEL PRODUCTION

Steel production in 2018 has continued to build on the strength seen in 2017, when crude steel production (CSP) increased by 5% over 2016. In the first 9 months of 2018, CSP was up 4.7% over 2017. While the largest growth has been in China and India, at increases of 6.1% and 6.3% respectively, the rest of the world has increased by 3% over 2017.

Blast furnace iron production (BFI) worldwide is up by 1.6%, with the largest increase seen in India and Germany, at 7.7% and 9.2% respectively. Table 19.3 shows steel and blast furnace iron production for the first 9 months of 2018 compared to the first 9 months of 2017.

Table 19.3 Steel and Blast Furnace Iron Production 2018 Over 2017 (January-September Only)

(Mt)	Crude Steel Production 2018 Over 2017 (January-September Only)			Blast Furnace Iron Production 2018 Over 2017 (January-September Only)		
	2018	2017	% Change	2018	2017	% Change
By Region						
EU 28	128.0	126.3	+1.3%	71.1	70.4	+1.0%
CIS	76.2	74.9	+1.7%	57.3	56.6	+1.2%
North America	89.7	86.8	+3.3%	26.0	25.0	+4.0%
South American	33.2	32.3	+2.8%	23.7	23.3	+1.7%
Asia	938.6	889.7	+5.5%	728.0	717.1	+1.5%
World Total	1338.8	1278.1	+4.7%	924.0	909.5	+1.6%
By Major Country						
China	691.2	651.5	+6.1%	570.2	562.7	+1.3%
Japan	78.6	78.3	+0.4%	58.5	58.8	-0.5%
India	79.7	75.0	+6.3%	53.1	49.3	+7.7%
USA	64.2	61.4	+4.6%	17.8	17.1	+4.1%
Russia	54.3	53.3	+1.9%	39.4	38.7	+1.8%
South Korea	54.2	53.1	+2.1%	35.2	35.2	+0.0%
Germany	34.0	32.9	+3.3%	23.7	21.7	+9.2%
Turkey	28.0	27.7	+1.1%	7.9	7.9	+0.0%
Brazil	26.1	25.5	+2.4%	21.1	21.1	+0.0%
Italy	18.3	17.8	+2.8%	3.6	3.9	-7.7%
Taiwan	17.3	17.0	+1.8%	11.0	11.3	-2.7%
World Excl. China	647.6	626.6	+3.4%	353.8	347.0	+2.0%
World Excl. China/India	567.9	551.6	+3.0%	300.7	297.7	+1.0%
China as % of World	51.6	51.0		61.7	61.9	

Source: World Steel Association Statistics September 2018



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China remains a key home for coking coals; in 2018 China accounts for 52% of world steel production and more importantly, it accounts for 62% of blast furnace iron production.

19.4 THE OUTLOOK FOR STEEL

The World Steel Association (Worldsteel) short range outlook (October, 2018) forecasts global steel demand will reach 1,657.9Mt in 2018, an increase of 3.9% over 2017. Ongoing strength is attributed to sustained investment activity in the developed economies, coupled with improved performance of the emerging economies.

For 2019, steel demand is forecast to grow a further 1.4% to 1,681.2Mt. Excluding China, steel demand is forecast to reach 900.2Mt, an increase of 2% over 2018 demand of 882.4Mt, which itself was an increase of 3.0% over 2017.

The outlook for China has both upside and downside elements; on the one hand the toughening of environmental regulations, coinciding with trade friction with the US, could see deceleration of steel demand in 2019. The upside is in the hands of the Chinese government in the form of possible stimulus measures to contain any potential slowdown in the economy.

In the US, there is potential weakness in auto demand and in construction, whereas a strong manufacturing sector, coupled with ongoing strong consumer spending supported by tax changes and fiscal stimuli, could maintain the recent growth seen in the sector.

Economic fundamentals in Europe remain healthy, while business confidence is high. Any downside would be as a possible deceleration tied to the uncertainty arising from global trade tensions.

19.5 COKING COAL OUTLOOK

Demand for hard coking coal is continuing at robust levels as steel industry fundamentals remain a strong driver for seaborne coking coal imports. Steel pricing is high on a worldwide basis.

In Japan, a very slight increase in steel production has contributed to a 4% increase in coking coal imports in the first 9 months of the year, from 30.9Mt to 32.1Mt.

Most industry observers believe that the current supply constraints for high quality coking coals are likely to remain that way for the foreseeable future. The closure of the Pinnacle low vol mine in the US, a fire at the North Goonyella Mine in Queensland, issues at the Moatize mine in Mozambique, and ongoing maintenance at two of the largest export terminals in Australia, have all contributed to the current market tightness.

Historically, coking coal producers (especially those in the US) were able to react quickly to a strong pricing environment with new coal production. This has not happened in 2018, since capital is still scarce following the bankruptcies of 2015 and 2016.

Chinese domestic coking coal prices are firm in the main producing regions, due to strong steel output and low inventory levels. Coking coal supply is also constrained by environmental inspections and safety inspections following recent fatalities.



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The ongoing demand for steelmaking raw materials from China and India is expected to drive demand for metallurgical coal as well as for iron ore. To meet emissions standards, cleaner blast furnaces are expected to be built on the Chinese southern coast which will benefit the ability of metallurgical coal exporters to compete with domestic suppliers.

China's One Belt One Road initiative is gathering momentum and is expected to drive growth through south and southeast Asia, which will require a robust supply of raw materials. BHP has estimated additional annual steel demand of around 150Mt over the 10-15 year timeframe of construction.

Longer term, the biggest risk to metallurgical coal pricing lies in a possible global economic slowdown, fueled by the fear of burgeoning trade wars.

19.6 PRICE BENCHMARKING OF GORDON CREEK DEPOSIT COKING COAL

Gordon Creek coking coal is benchmarked off comparable coals from Australia and Canada. The Gordon Creek Seams B, D, (Zone) F and G encompass mid vol coking coals (20-25% VM) which vary considerably with regard to rheology, ash content and petrography. The Gordon Creek coking coals were compared to a series of coking coals from Australia and Canada, including coking coals from northeast BC, as shown in Table 19.1.

Seams J and K are low vol coals (18-19% VM) suitable as a PCI product. These seams were compared to PCI coals from Queensland and northeast BC, as shown in Table 19.2.

The comparative coals, both coking coals and PCI, vary considerably in quality, which is reflected in the price relationship between those coals and the benchmark premium coking coals.

Table 19.4 summarizes the key quality parameters of the different Gordon Creek seams. For each seam, these parameters were compared to coals of similar quality, the aim being to determine an appropriate discount for each seam to the prime benchmark coking coal price. The quality data was provided by Colonial, with the exception of CSR, which was estimated on the basis of industry-derived CSR formulae, combined with the author's experience related to coals from northeast BC. The evaluation is subject to CSR levels being determined through testing in pilot scale ovens.



Table 19.4 Gordon Creek Project Seam Qualities

Seam	Product	CSR	Volatile Matter % (adb)	Ash % (adb)	Sulphur % (adb)	Phosphorus % (db)	Fluidity DDPM	Total Dilatation	Vitrinite	Total Reactives	RoMax	Base/Acid Ratio
B	SHCC	50 - 52	25.1	8.9	0.89	0.085	1,135	144	58.9	72.4	1.18	0.215
D	HCC	64 - 66	25.1	8.4	0.82	0.050	1,120	102	46.9	65.9	1.17	0.097
F	SHCC	54 - 56	21.4	8	0.44	0.049	12	19	55.7	71.5	1.32	0.197
G	HCC	68 - 72	20.6	7.9	0.53	0.089	26	42	59.1	72.7	1.39	0.080
J	LV PCI	na	18.4	8.5	0.37	0.020	na	na	na	na	1.43	0.104
K	LV PCI	na	18.1	6.0	0.41	0.002	na	na	na	na	1.43	0.096

The quality of the Gordon Creek coal seams can be differentiated on the basis of commercial classification:

1. Hard Coking Coal (HCC)
2. Semi Hard Coking Coal (SHCC)
3. Pulverised Coal Injection (PCI)

19.6.1 Hard Coking Coal (HCC)

Seams D and G are expected to produce hard coking coals, exhibiting strong coke strength characteristics.

Seam D, as a medium volatile, high fluidity coal, compares to the HCC 64 mid vol coals which usually reach 90 – 94% of the HCC Premium price, although penalties would be incurred due to its sulphur content.

Seam G, a low mid vol, low fluidity coal, is very similar in quality to the HCC currently exported from southeast BC and can be expected to deliver coke strength similar to the best coking coals traded internationally. While base/acid ratios are attractive, penalties would likely be incurred for phosphorus content. Hard coking coals of similar quality are usually priced in the range 95-97% of Premium HCC.

19.6.2 Semi Hard Coking Coal (SHCC)

Seam B and Zone F are not expected to exhibit the coke strength characteristics necessary to be classified as hard coking coals. This is due to the ash chemistry being rich in alkalis, which cannot be compensated by other, more attractive quality features.

Seam B is a mid vol coal with good rheology, boasting very high levels of fluidity and dilatation when compared to other Canadian coals. Seam B compares to semi hard coals from Queensland which are usually priced below 90% of the HCC Premium price. Seam B coals would also incur penalties for sulphur and phosphorus content.



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Zone F is a low mid vol, low fluidity, low ash, low sulphur coal. The base/acid ratio will have a negative effect on coke strength, leading to its classification as a semi hard coking coal. Comparative coals are priced at around 90% of the Premium HCC price.

19.6.3 Pulverised Injection Coal (PCI)

Seams J and K are low volatile coals with low ash, low sulphur, low phosphorus and high carbon content, which are essential characteristics in determining suitability as PCI coals. The high carbon (on a dry, ash free basis) is expected to result in Coke Replacement Ratios that are comparable to those of the premium low vol PCI coals from Queensland and northeast BC.

While these coals could be considered for use as semi soft coking coals (SSCC), the low rheology would work against this; a more sustainable price point is obtained by comparison with the premium low vol PCI coals, in respect of which Seams J and K would be considered fully competitive.

19.7 PRICE OUTLOOK FOR GORDON CREEK METALLURGICAL COAL

Table 19.5 indicates the projected pricing for Gordon Creek Seams B, D, (Zone) F, G, J and K, as a percentage of the benchmark low vol premium HCC, incorporating relevant premium/discount factors for either ash content, sulphur content or phosphorus content.

The following quality penalty/premiums are utilized in determining price adjustments for the HCC and SHCC quality variations:

- Ash content: US \$1.00pt per 1% ash
- Sulphur content: US \$1.00pt per 0.01% sulphur
- Phosphorus content: 3% of price per 0.01% phosphorus in coal.

Table 19.5 Gordon Creek Seam Price Calculations

	% of Benchmark		Price as % of Benchmark (US \$/MT)		S % (adb)	S Penalty/Premium	Ash % (adb)	Ash Penalty/Premium	%P in Coal (db)	P in Coal Penalty	Long Term Price 2021 (US \$/MT)	
Benchmark Coking Coal	100%		170	200							170	200
Tier 2 HCC Pricing	93%	94%	158	188							158	188
Price for Seam B	88%	89%	150	178	0.89	-\$430	888		0085	-\$350	142	170
Price for Seam D	93%	94%	158	188	0.82	-\$220	837		0050		156	186
Price for Zone F	90%		153	180	0.44	\$0.30	835	\$064	0049		154	181
Price for Seam G	96%	97%	163	194	0.53	-\$080	793	\$157	0089	-\$300	161	192
Low Vol PCI Benchmark	100%		129	152							129	152
Price for Seam J	100%		129	152							129	152
Price for Seam K	100%		129	152							129	152



20.0 ENVIRONMENTAL STUDIES, PERMITTING & SOCIAL/COMMUNITY IMPACTS

20.1 ENVIRONMENTAL SETTING & STUDIES

The entire Peace River Coal Field contains areas where unique considerations related to wildlife, archaeology and environment must be considered. The Flatbed Property and surrounding area contains habitat used by the Quintette caribou herd. Much of the area overlying the Gordon Creek deposit has been mapped by the Ministry of Environment as Caribou High Elevation Winter Range Habitat (HEWR), which is bordered to the east by Caribou Low Elevation Winter Range Habitat. To provide guidance to Colonial's employees and sub-contractors, during exploration activities, Colonial developed the Flatbed Caribou Mitigation and Monitoring Plan (Turney, 2017) to ensure that impacts to caribou habitat and caribou populations within the Flatbed Property area are minimized.

Prior to commencing exploration activities, Colonial was required by the BC Ministry of Energy Mines and Petroleum Resources (EMPR) to complete an Archaeological Overview Assessment (AOA) desktop study of the entire Flatbed Property. The AOA (Hill and Storey, 2014) found that a significant portion of the property had Moderate or High Surface/Subsurface Archaeological Potential Probability of Presence (PoP). Based on this assessment, Colonial committed to having the locations of all planned 2017 ground disturbance that fell within the Moderate or High PoP categories, undergo a Preliminary Field Reconnaissance (PFR) by an archaeologist. No sites of archaeological interest were identified. A Chance Find Procedure has been implemented for the Flatbed Property.

The Flatbed Property also contains ground covered by Ungulate Winter Range (URW) and Old Growth Management (OGM) Areas. Ungulate Winter Range is located in the eastern section of the property but is not present within the Gordon Creek deposit. There are two Old Growth Management Areas (OGMs) within the property, one in the northwest, which partially covers the Gordon Creek deposit, and one in the southeast.

Colonial's current Notice of Work permit allows helicopter-supported drilling in the Gordon Creek OGM and within the HEWR. However, any planned trail construction within the Gordon Creek OGM and HEWR will require an amendment to the Notice of Work permit.

Environmental baseline studies, to support an eventual comprehensive Environmental Assessment, are often started during more advanced exploration-stage projects. Typically, these include gathering two years of baseline data focused on surface hydrology and water quality, groundwater (water quality and levels), geochemical characterization, sediment quality, aquatic resources (benthic invertebrates, periphyton), metals concentrations in tissue (fish and benthic invertebrates), fish and fish habitat, soils, vegetation, wildlife, air quality and noise. Such data are used to document the environmental baseline, complete an environmental effects assessment, and modeling, to support permit applications.



20.2 POTENTIAL ENVIRONMENTAL ISSUES

20.2.1 Caribou

In November 2017, the governments of Canada and BC reached a draft Conservation Agreement regarding southern mountain caribou to address concerns related to the continuing decline of caribou populations in Canada and the impact this is having on biodiversity and on Indigenous Peoples, in particular. The long-term goal of the Conservation Agreement is to achieve self-sustaining populations in the Central Group of the Southern Mountain Caribou which includes the Pine River, Quintette and Narraway herds.

One strategy to achieve this will be through the avoidance, mitigation and off-setting of impacts on caribou habitat, particularly high elevation winter and summer tenured habitat, and to a lesser extent, non-high elevation habitat. The Recovery Measures for Southern Mountain Caribou (Draft Conservation Agreement 2017, Section 8) state that:

“Additional planning and analysis will be required to ensure full consideration of existing tenure rights (and any limits on those tenure rights) to achieve necessary habitat protection in a timely and cost-effective manner over time.”

The final agreement is expected in 2019.

20.2.2 Selenium

The release of selenium from coal mining is a known concern. In response, a significant amount of research is being done to understand the release of selenium during mining and what causes it to be problematic in the environment, in addition to research into solutions for management and mitigation of the effects of selenium on the environment. The nearby Trend Mine has installed a selenium water treatment plant.

20.3 PERMITTING

20.3.1 Existing Permits

The understanding of the current permitting / regulatory environment presented herein is based upon what is known at this time.

To conduct coal exploration in BC, a company must hold tenure under a coal license and possess a valid *Mines Act* Notice of Work permit.

Mines Act permit CX-9-061 was issued to Colonial on August 14th, 2014 to conduct coal exploration activities on the Flatbed Property. An amendment to the Permit was issued on January 16th, 2018. The permit and amendment expire on December 31st, 2018 and December 31st, 2019, respectively. During 2018, Colonial submitted a request for both the permit and permit amendment to be extended until December 31, 2021. The reclamation security currently held in association with permit CX-9-061 is CAN \$128,200.

In order to clear more than 50m³ of timber for exploration and mining activities in BC, a company must hold an Occupant License to Cut (OLTC). OLTC L49722 was issued to Colonial on April 23, 2015 to fall timber to facilitate coal exploration activities on the Flatbed Property. The OLTC expires on December 31, 2018.



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In order to construct exploration and mining access trails that fall outside of a company's coal licenses in BC, a company must hold a Special Use Permit (SUP). SUP S25794 was issued to Colonial on October 1, 2014 to construct a 70m exploration access trail that would connect the southwest corner of Coal License 418548 to an all-weather O&G access road that forms part of the Trend mine's internal access infrastructure. The SUP has no expiry date.

In order to clear less than 50m³ of timber for exploration and mining activities in BC, a company must hold a Free Use Permit (FUP). FUP 20731 was issued to Colonial on September 24, 2014 to fall timber to facilitate the construction of the 70m exploration access trail listed above. The FUP expires on December 31, 2018.

20.3.2 Permitting Mining Projects in British Columbia

To advance a project to mine development in BC, the project must first acquire a provincial Environmental Assessment Certificate and a federal Decision Statement. These authorizations allow a project to proceed to acquire the many permits required for mine construction, operation and closure.

Presently, large-scale mining projects trigger an environmental assessment under both the *Canadian Environmental Assessment Act* and the *BC Environmental Assessment Act*. The environmental assessment process is managed by both the Canadian Environmental Assessment Agency (CEAA) and British Columbia Environmental Assessment Office (BCEAO). Both processes provide opportunities for public, First Nations and regulator input during the pre-application and application review stages. Timelines in preparing and approval of these documents vary and can take two to three years depending on the project. In 2012, changes to the *Canadian Environmental Assessment Act* allowed the BCEAO to request a substitution from CEAA. This means that instead of running two parallel environmental assessment processes, CEAA can substitute the BC environmental process for the federal process, thereby eliminating much duplication.

Changes are in process federally to repeal the *Canadian Environmental Assessment Act* and replace it with the *Impact Assessment Act* (Bill C-69) and to replace the Canadian Environmental Assessment Agency with a new independent authority, the Impact Assessment Agency of Canada. The new *Impact Assessment Act* will have revised timelines compared to CEAA, increased Indigenous participation, broadened alternatives assessment, amongst other changes. The Bill passed second reading in March 2018. The Act is expected to come into effect in 2019.

Additionally, in early 2018 the BC government initiated an environmental assessment revitalization process focused on enhancing public confidence and meaningful participation, advancing reconciliation with First Nations, protecting the environment and supporting sustainable development. This culminated in Bill 51 - The Environmental Assessment Act passing in the legislature in early November 2018; however, there are still a number of policies and regulations that must be developed before the bill comes into force (anticipated in late 2019).

Numerous permits, approvals, licenses and authorizations related to the construction, operation and closure of a mine are required to be in hand prior to the commencement of any development work. Generally speaking, these permits are applied for following submission of the environmental impact assessment application, though there is the option under the Concurrent Approval Regulation of the *Environmental Assessment Act* to apply for permits concurrently.



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Table 20.1 provides a listing of some of the numerous provincial permits, approvals, licenses and authorizations that are required prior to the start of any mine development activities. Of note, until a *Mines Act* permit is issued, no other permits, approvals, licenses or authorizations can be issued. Table 20.2 provides a listing of possible federal permits. Amendments to the *Fisheries Act* and the *Navigation Protection Act* (to be renamed the Canadian Navigable Waters Act) are currently being proposed under Bills C-68 and C-69, respectively.

Table 20.1 Provincial Permits, Approvals, Licenses and Authorizations needed for Mine Development

Provincial Permits	Description	Act
Mines Act permit	Approval to construct, operate and reclaim mine and its infrastructure	<i>Mines Act</i>
Coal Lease	Land occupancy for mine (sub-surface rights)	<i>Mineral Tenure Act</i>
Surface Lease	Surface land occupancy for mine and site infrastructure	<i>Land Act</i>
License of Occupation	Land occupancy for other features (e.g., borrow pits)	<i>Land Act</i>
Statutory Right of Way	Land occupancy for linear features	<i>Land Act</i>
Waste Discharge Permit – Water	Approval to discharge mine effluent and sewage into the environment	<i>Environmental Management Act</i>
Waste Discharge Permit – Air	Approval to discharge air emissions into the environment	<i>Environmental Management Act</i>
Occupant License to Cut	Approval to remove timber (mine, infrastructure, borrow areas)	<i>Forest Act</i>
Road Use permit	Approval to use existing forestry roads	<i>Forest and Range Practices Act</i>
Special Use permit	Approval to construct new roads	<i>Forest Practices Code of B.C.</i>
Water License	Approval to construct, maintain and decommission water works	<i>Water Sustainability Act</i>
Section 11 Approval	Approval to make changes in and about a stream	<i>Water Sustainability Act</i>
Section 10 Approval	Approval for short term use of surface water	<i>Water Sustainability Act</i>
Authorization for Public Highway Use	Approval to use public highways	<i>Transportation Act</i>
Exemption Permit	Approval to haul concentrate (if required)	<i>Transportation Act</i>
Health Authority Permits and Approvals	To construct and operate a potable water system	<i>Drinking Water Protection Act</i>



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Table 20.2 Federal Permits

Federal Permits	Description	Act
Navigable Waters Approval	Approval to build bridges across navigable waterways	<i>Navigation Protection Act</i>
Section 35(2) Authorization	Allows for the harmful alteration, disruption or destruction of fish habitat (HADD) (e.g. stream diversion)	<i>Fisheries Act</i>
Explosives Magazine License	Approval to store explosives	<i>Explosives Act</i>
Radio Licenses	Approval to operate radios	<i>Radio Communications Act</i>

20.4 SOCIAL OR COMMUNITY IMPACT

Social and community related requirements and plans for the Gordon Creek Project include keeping those First Nations with an interest in the Project area, and local communities, informed about planned Project activities and advancement plans.

20.4.1 First Nations

The Flatbed Property is located within Treaty 8 First Nations Territory. First Nations (Treaty 8 and non-Treaty 8) with interests and asserted claims in the Flatbed area are the:

- West Moberly First Nations (Treaty 8 First Nation)
- McLeod Lake Indian Band (Treaty 8 First Nation)
- Saulneau First Nations (Treaty 8 First Nation)
- Halfway River First Nation (Treaty 8 First Nation)
- Kelly Lake Communities made up of:
 - Kelly Lake First Nation
 - Kelly Lake Cree Nation
 - Kelly Lake Metis Settlement Society.

Other First Nations with potential interests in the Project area are:

- Doig River First Nation (Treaty 8 First Nation).

Colonial communicated (by way of a letter) during 2012 with all of the First Nations listed above in order to introduce the company and the company's Projects, and to encourage them to contact Colonial if they had any questions or concerns. Follow-up meetings were subsequently held with three of these First Nations both during, and since, 2012. Prior to 2012, communications with First Nations were intermittent and related to planned work programs and permitting. Since 2012, letters have also been sent to First Nations in order to provide regular updates regarding the activities of the company.

20.4.2 Local Communities

Given the early stage of the company's Projects, community engagement has been minimal to date but has, since 2012, included meetings with the Mayors, Councillors and Economic Development Officers of Tumbler Ridge and Chetwynd. The goal of these meetings was to introduce the company and the company's Projects, as well as to initiate regular contact with these



communities. In addition, since 2012, regular corporate update letters have been sent to these two communities.

20.5 CLOSURE REQUIREMENTS

As a condition of their Mines Act permit, Colonial is required to continually and progressively reclaim the surface of the land affected by their activities. To date, Colonial has reclaimed those areas no longer required for future exploration activities.

20.6 CONCLUSIONS

There are no known environmental issues that could impact the ability to mine the Gordon Creek deposit, although the extent and scope of caribou and selenium management methods and requirements have yet to be determined. Monitoring, management, mitigation and permitting issues are expected to be similar to other coal development projects of similar size in the region. The most recent coal project in northeast BC to receive a provincial Environmental Assessment Certificate (October 1, 2015) and federal Environmental Assessment Decision Statement (December 14, 2017) was the Murray River underground coal mining project.



Capital and Operating Costs

21.0 CAPITAL AND OPERATING COSTS

Costs and revenues have been generated based on information provided from a variety of sources including:

- Stantec's internal cost database
- Recently completed projects
- Published cost data.

Capital and operating cost estimates have been prepared for the major cost items and activities of the conceptual mine design. There are no contingencies included in capital or operating costs. All cost estimates are in constant CAN \$ 2018.

The pre-production capital cost of the underground mine is taken as the total capital required to achieve initial coal production by the end of Year 1 and is estimated at CAN \$391M. An additional CAN \$528M has been estimated for sustaining capital to replace and add equipment (principally underground mining equipment) and facilities necessary to sustain production over the planned mine life. Table 21.1 below shows the initial capital by year.

Table 21.1 Pre-Production Capital Requirements (CAN \$000's)

	Year -4	Year -3	Year -2	Year -1	Year 1	Total
Facilities and Infrastructure	\$16,768	\$85,985	\$102,694	\$89,719	-	\$295,166
Underground Mining Equipment	-	-	-	\$24,606	\$70,758	\$95,364
Total	\$16,768	\$85,985	\$102,694	\$114,325	\$70,758	\$390,530

Capital required for the initial development of the site provides the support and access to Seam B. The five other seams are then accessed in descending order with the pre-operation capital providing support for the continued mining operation. Table 21.2 provides the total costs for pre-operation plus the required capital for each additional seam mined, broken down by key categories.



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Table 21.2 Capital Required for Mining Operations in Each Mineable Seam (CAN \$ 000's)

	Pre- Operation Year -4 to -1	Seam B Year 1 to 8	Seam D Year 5 to 13	Zone F Year 11 to 20	Seam G Year 18 to 22	Seam J Year 20 to 27	Seam K Year 25 to 30	Total
Acquisition & Permitting	-	-	-	-	-	-	-	-
Slope Access	\$107,619	-	\$12,568	\$5,274	\$5,716	\$11,272	\$5,334	\$147,783
Surface Infrastructure	\$187,548	-	-	-	-	-	-	\$187,548
Preparation Plant & Refuse	-	\$10,000	\$6,500	\$10,000	\$2,000	\$5,500	\$5,500	\$39,500
Longwall	-	\$90,785	\$59,674	\$78,791	\$8,764	\$42,451	\$16,547	\$297,012
Continuous Miner	\$19,965	\$11,969	\$14,363	\$13,732	\$7,911	\$16,877	\$1,495	\$86,312
Support Equipment	-	\$15,624	\$9,325	\$24,625	-	\$15,385	\$9,240	\$74,199
Safety Equipment	\$3,503	\$4,367	\$2,492	\$3,394	\$1,598	\$1,042	-	\$16,396
Conveyance	\$1,138	\$30,549	\$2,339	\$6,448	\$9,887	\$5,951	\$3,589	\$59,901
UG Infrastructure	-	\$4,692	\$409	\$1,369	\$1,467	\$1,260	\$724	\$9,921
Total	\$319,773	\$167,985	\$107,670	\$143,634	\$37,343	\$99,738	\$42,430	\$918,572

21.1 UNDERGROUND MINE CAPITAL AND OPERATING COSTS

21.1.1 Capital Requirement Underground Mine

A summary of the individual capital costs to reach initial production for underground mining equipment items is presented in Table 21.3.

Table 21.3 Development & Equipment Capital to Reach Initial Production, Underground

Description	CAPEX (CAN \$000's)
Slope, Shafts, and Hoists	\$90,369
Ventilation, Fans	\$5,526
Slope Access Conveyors	\$11,725
Conveyors and Extension	\$8,899
Longwall System (Complete)	\$45,775
Development System (CM/RH)	\$31,933
Support Equipment	\$4,125
Safety Equipment	\$4,631
Total	\$202,983

Capital spending for the underground is projected to begin in Year -3, three years before the start of production from the underground operations. As shown in Table 21.3 the initial development and initial underground equipment through Year 1 total CAN \$203M. The remaining capital expenditures for underground equipment over the LOM is

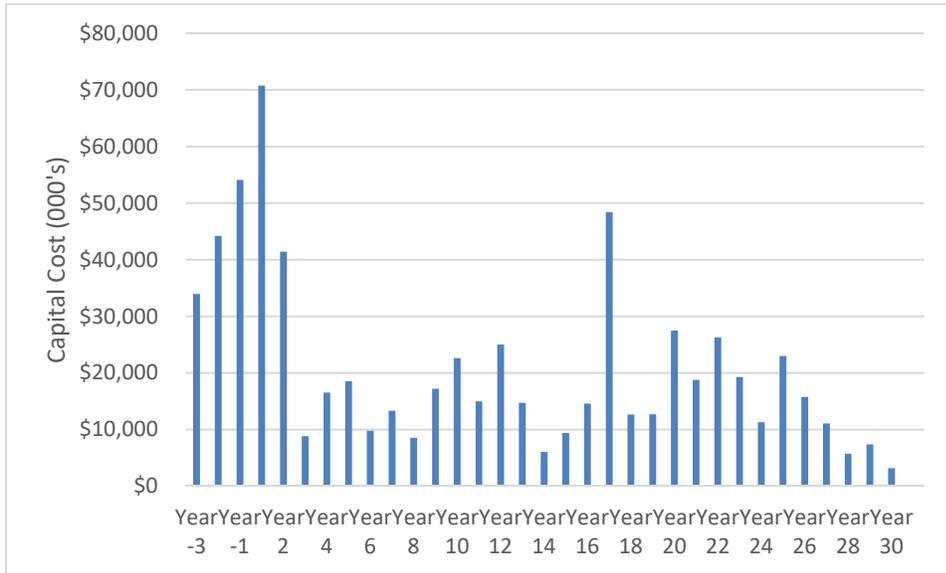


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Capital and Operating Costs

projected to reach CAN \$489M over the final twenty-seven years. The accumulation of underground capital costs over the LOM is shown in Figure 21.1.

Figure 21.1 Underground Capital Requirements, Life-of-Mine



21.1.2 Operating Costs Underground Mine

Operating costs for the underground mine were developed by utilizing industry standards. Stantec's knowledge of the mining methods used, industry costing guides, and regional costing adjustments. The operating cost is presented in Table 21.4 on a unit cost basis, i.e., Canadian dollars per ROM tonne of coal produced and is divided into categories involved with the cash cost of operations. Labour costs were developed from the manpower and shift schedule projected in the mine plan, and average wage and benefit rates for multiple skill-based personnel in the region. The operating cost totals CAN \$20.91/ROM tonne.



Capital and Operating Costs

Table 21.4 Operating Costs, Underground

Description	Operating Cost (CAN \$ per ROM tonne)
Supplies and Services	
Drilling and Ground Control	3.41
Operating Supplies	1.41
Repair and Maintenance	2.63
Fuel and Lubrication	0.14
Contracted Services	0.08
Utilities	1.00
Labour	12.24
Total	20.91

21.2 FACILITIES, COAL HANDLING AND PREPARATION PLANT – CAPITAL AND OPERATING COSTS

21.2.1 Capital Costs: Facilities, Coal Handling and Preparation Plant

The projected capital costs for the Gordon Creek Project including the mine site facilities, coal handling at the mine site, coal preparation plant, rail loadout and coal handling at the loadout are estimated at CAN \$188M and include the following components:

- Site preparation including access improvement, stripping and grading
- Construction of the maintenance/warehouse complex and office/bath house facility
- Construction of a 230kV powerline to the site
- Water management structures
- Coal preparation plant which includes processing equipment, and a building shell with an overhead crane
- Raw coal conveyor system, stockpile(s), and reclaim systems to feed the plant
- Clean coal stacking conveyor, stockpile area, refuse handling, and truck loadout
- Rail loop and train loading system including truck dump, stacking stockpile with reclaim system scales and car sprayer system.

Capital costs for the surface operation facilities and infrastructure (including construction) have been based on estimates from recently completed projects in the region and on Stantec’s internal database with adjustments for site specific conditions. Table 21.5 summarizes the facilities infrastructure capital costs.



Capital and Operating Costs

Table 21.5 Facilities Infrastructure Capital Requirements

Description	CAPEX (CAN \$000's)
Construction/Site Prep	\$22,955
Power	\$12,578
Water/Other Utilities	\$3,774
Mine Structures/Buildings	\$15,000
ROM Coal Handling/Storage	\$12,000
Coal Preparation Plant	\$65,000
Refuse Handling	\$13,968
Clean Coal Handling/Storage	\$9,312
Rail Access/Loadout Loop	\$16,560
Rail Loadout and Coal Handling	\$16,400
Total	\$187,548

21.2.2 Operating Costs: Facilities, Coal Handling and Preparation Plant

The combined facilities, plant, trucking, and rail loadout costs have been estimated at approximately CAN \$9.11 per clean tonne based on costs typical of the industry, facilities, and region.

21.3 OFF-SITE AND CORPORATE OVERHEAD COSTS

21.3.1 Off-site Costs

Off-site costs include trucking from the plant site to the rail loadout, rail transport, rail loadout to port (Ridley terminal), and port charges have been estimated at approximately CAN \$33.05 clean tonne over the LOM.

21.3.2 Corporate Overhead

A provision of CAN \$3.3M annually is included for corporate overhead allocations. An additional CAN \$1.7M annually has been included for property and liability insurance. Because the project does not lie within the boundaries of a municipal tax district in BC, there is no provision for local property taxes.

21.4 MANPOWER SCHEDULE

Colonial will be challenged to maintain a skilled and experienced underground workforce with the ramp up of mining sections along with the introduction of new equipment and underground mining conditions as operations begin in the Gordon Creek longwall mine.

In order to address this issue, Colonial will need to incorporate an aggressive employee location and skill training plan and/or identify a contract workforce with available experience to offset manpower short falls. Key operations salary personnel need to be identified early in the process. A three to four-year site construction process will allow the



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Capital and Operating Costs

identification of solid candidates. The year prior to production, the road header/continuous mining crews for the two units need to be selected, with the second crew being on site in the first quarter after starting production. Key longwall salaried and maintenance staff need to be on site by mid-year of the first year of production, sooner if possible.

The manpower projection assumes that the underground personnel, the surface personnel at the CPP and the train loadout, along with the surface general personnel are Colonial workforce. The trucking personnel are projected to be supplied by a trucking contractor. The projected manpower is summarized in Table 21.6.

Table 21.6 Projected Manpower

Workforce	Number
Underground	
Production Hourly	105
Support Hourly	42
Underground Salary	25
Surface (CPP)	
Hourly	36
Salary	9
Surface General	
Hourly	11
Salary	14
Total Hourly	194
Total Salary	48
Total Manpower	242

21.5 OPERATING COST SUMMARY

Total costs FOB port, including direct mine site costs, offsite costs and indirect costs are estimated at CAN \$105.19pt. This includes mine site costs of CAN \$53.51pt, offsite costs of CAN \$33.05pt for trucking, rail car loading, rail and port charges, and indirect costs of CAN \$18.63pt for mineral taxes, royalties and corporate overhead.

Table 21.7 shows the cost for underground tonnes on a LOM basis, ROM tonne basis and clean tonne basis.



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Capital and Operating Costs

Table 21.7 Operating Cost Summary

On-Site Costs	LOM Costs (CAN \$M)	CAN \$/ROM Tonne	CAN \$/ Clean Tonne
Direct Underground Mining	2,333	20.91	40.64
Coal Preparation	523	4.69	9.11
Administration	216	1.93	3.76
Sub-Total On-Site Costs	3,072	27.53	53.51
Off-Site Costs	LOM Costs (CAN \$M)	CAN \$/ROM Tonne	CAN \$/ Clean Tonne
Loading / Trucking / Port	1,897	17.01	33.05
Corporate Overhead / Taxes / Royalties / Coal Sampling	1,070	9.59	18.63
Sub-Total Off-Site Costs	2,967	26.59	51.68
Operating Costs	LOM Costs (CAN \$M)	CAN \$/ROM Tonne	CAN \$/ Clean Tonne
Total Operating Costs, LOM	6,039	54.12	105.19



22.0 ECONOMIC ANALYSIS

22.1 PRINCIPAL ASSUMPTIONS

Annual coal production is based on the mine plans described in Section 16 of this report. The underground development will begin in Year -4 with first production in Year 1. Operations will continue production for 30 years.

Access to the first coal seam is expected in Year 1, after four years of infrastructure and access development. Initial production from CM development units is slated for Year 1 with longwall production following in Year 2. An estimated annual average of 3.8Mtpa ROM is expected over 29 years of full production. The LOM total is approximately 111.6Mt ROM over the full 30 years of development and production. The expected overall yield of 52% results in 57.4Mt saleable coal from the Gordon Creek operation.

Capital and operating costs have been estimated as shown in Section 21. It was assumed that mine closure costs would have relatively little effect on the NPV, and they were not considered at this conceptual level of study.

Depreciation is based on the capital costs described in Section 21 of this report and the declining balance method prescribed by the Canada Revenue Agency. The majority of the capital is in Class 41b which carries a 25% depreciation rate.

Income tax rates of 11% for BC Provincial tax and 15% for Canadian Federal tax have been applied.

22.2 NET PRESENT VALUE ANALYSIS

Cash flow summaries are shown in Tables 22.1 and 22.2, while NPVs and IRRs are shown in Tables 22.3 and 22.4. Due to the preliminary nature of this study, capital and operating costs are within a range of $\pm 50\%$, contingency costs were not included in the economic model. The following figures and tables are shown in both US \$ and CAN \$. The exchange rate used for this report is US \$1.00 = CAN \$1.30.

For the NPVs provided in Tables 22.3 and 22.4, coal prices have been derived as:

- CAN \$20 less than average sales price LOM; yielding CAN \$188.71 and US \$145.16.
- The average sales price LOM, or CAN \$208.71 and US \$160.54.
- CAN \$20 more than average sales price LOM; yielding CAN \$228.71 and US \$175.93.



TECHNICAL REPORT PRELIMINARY ECONOMIC ASSESSMENT FOR THE GORDON CREEK DEPOSIT - FLATBED COAL PROPERTY, BRITISH COLUMBIA

Economic Analysis

Table 22.1 Cash Flow Summary in Canadian Dollars (M)

	Years -4 to -1	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 to 10	Years 11 to 15	Years 16 to 20	Years 21 to 25	Years 26 to 30	Total
Gross Revenue	-	48.3	248.8	440.9	528.3	469.4	2,229.0	2,165.1	2,040.5	2,061.7	1,750.0	11,982.0
Off-site Costs	-	7.7	39.7	70.3	84.3	74.6	340.6	318.8	303.2	348.5	309.9	1,897.4
Production Taxes & Royalties	-	0.7	6.2	11.8	27.4	40.9	196.1	196.0	174.2	167.2	141.2	961.6
Direct Mine Costs	35.9	55.0	84.7	107.5	118.6	111.4	542.6	491.3	492.6	543.4	497.5	3,080.5
Corporate Overhead	-	3.3	3.3	3.3	3.3	3.3	16.6	16.6	16.6	16.6	16.6	99.6
Income Tax	-	-	-	31.7	59.3	48.0	252.0	268.3	247.2	227.9	184.3	1,318.7
Capital Costs	319.8	70.8	42.4	9.8	19.0	19.5	77.9	80.9	123.8	105.1	49.5	918.6
Total Yearly Cash Flow	(355.6)	(89.2)	72.5	206.4	216.3	171.7	803.3	793.3	683.0	653.1	551.0	3,705.5

Table 22.2 Cash Flow Summary in US Dollars (M)

	Years -4 to -1	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 to 10	Years 11 to 15	Years 16 to 20	Years 21 to 25	Years 26 to 30	Total
Gross Revenue	-	37.1	191.4	339.2	406.3	361.1	1,714.7	1,665.5	1,569.6	1,585.9	1,346.2	9,216.9
Off-site Costs	-	5.9	30.5	54.1	64.8	57.4	262.0	245.2	233.2	268.1	238.4	1,459.6
Production Taxes & Royalties	-	0.6	4.7	9.1	21.1	31.5	150.9	150.7	134.0	128.6	108.6	739.7
Direct Mine Costs	27.6	42.3	65.2	82.7	91.3	85.7	417.4	377.9	378.9	418.0	382.7	2,369.6
Corporate Overhead	-	2.6	2.6	2.6	2.6	2.6	12.8	12.8	12.8	12.8	12.8	76.6
Income Tax	-	-	-	24.4	45.6	36.9	193.8	206.4	190.2	175.3	141.7	1,014.4
Capital Costs	246.0	54.4	32.6	7.6	14.6	15.0	59.9	62.3	95.2	80.8	38.1	706.6
Total Yearly Cash Flow	(273.6)	(68.6)	55.7	158.8	166.4	132.1	617.9	610.2	525.4	502.4	423.8	2,850.4



Table 22.3 Economic Analyses Results in Canadian Dollars (M)

Coal Price CAN \$/t	NPV (CAN \$M) at Varying Discount Rates with IRR			
	5%	7.5%	10%	IRR (%)
188.71	\$1,104	\$689	\$429	21.3%
208.71	\$1,405	\$898	\$579	24.4%
228.71	\$1,706	\$1,106	\$729	27.2%

Table 22.4 Economic Analyses Results in US Dollars (M)

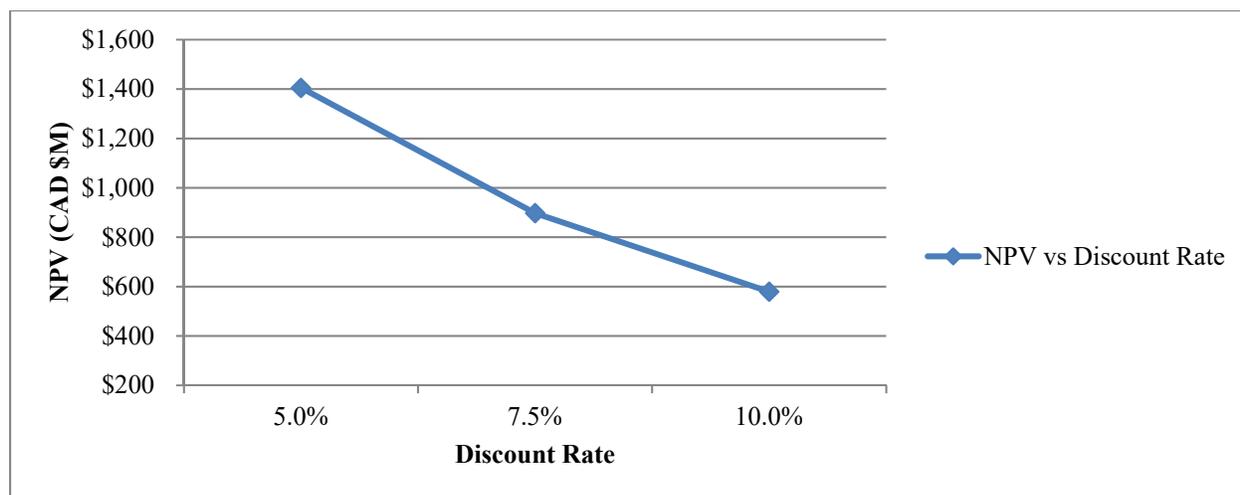
Coal Price US\$/t	NPV (US\$M) at Varying Discount Rates with IRR			
	5%	7.5%	10%	IRR (%)
145.16	\$849	\$530	\$330	21.3%
160.54	\$1,081	\$691	\$446	24.4%
175.93	\$1,312	\$851	\$561	27.2%

This PEA is preliminary in nature and includes Inferred mineral resources. Inferred mineral resources are considered too speculative geologically to have technical and economic considerations applied to them that would enable them to be categorized as mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

22.3 SENSITIVITY ANALYSIS

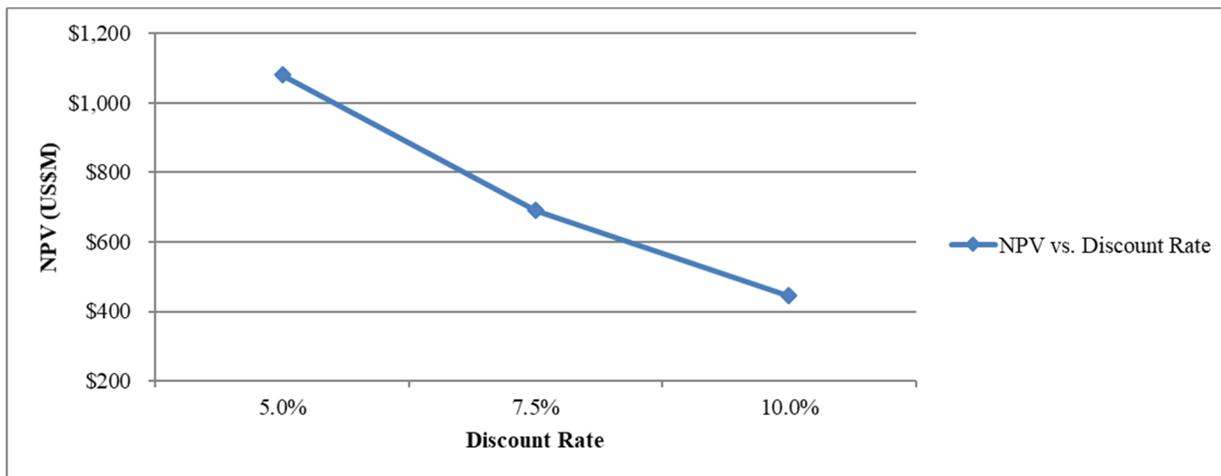
The sensitivity of NPV to discount rate (at a LOM price of US160.54 per clean tonne) is shown on Figures 22.1 and 22.2.

Figure 22.1 Sensitivity of NPV to Discount Rate in Canadian Dollars



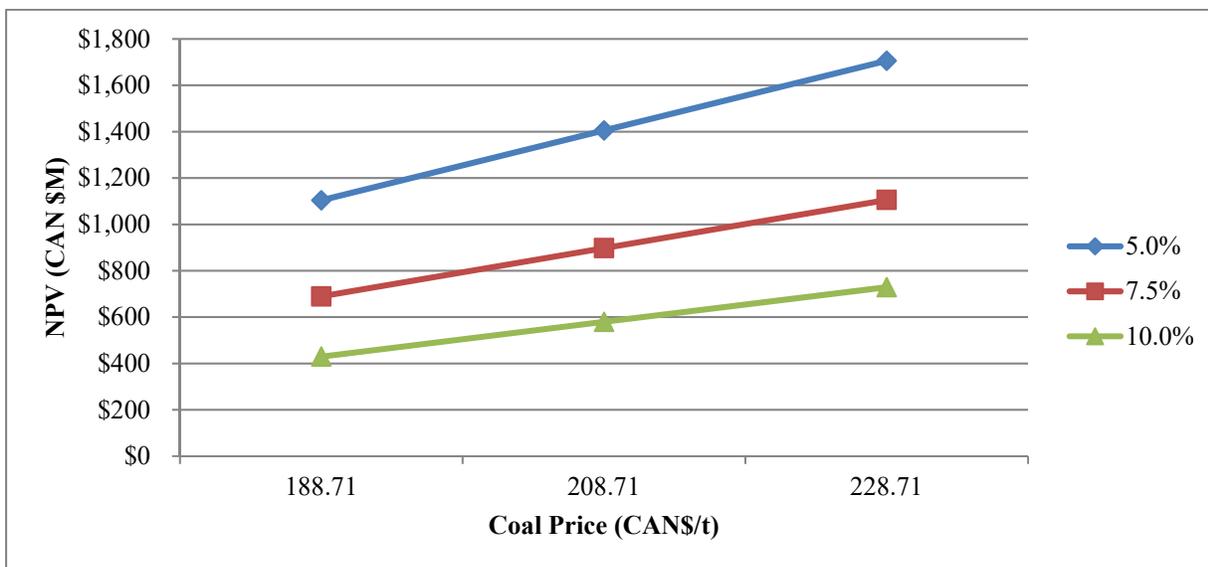
Economic Analysis

Figure 22.2 Sensitivity of NPV to Discount Rate in US Dollars



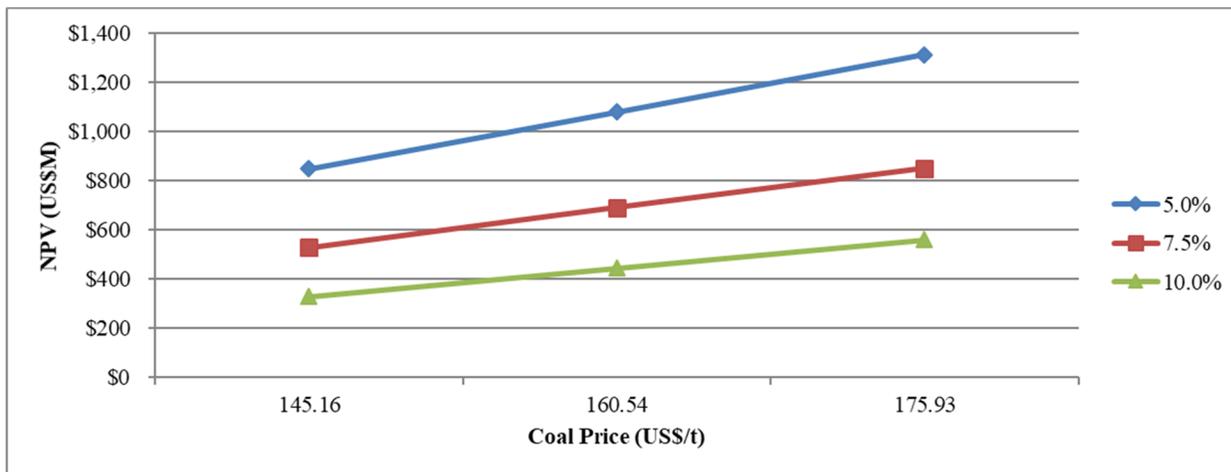
The sensitivity of NPV to variances in coal price (\$ per clean tonne), at various discount rates, is shown on Figures 22.3 and 22.4. This analysis suggests that the break-even price is less than US \$91, US \$96, and US \$103pt for discount rates of 5%, 7.5% and 10%, respectively. A coal price of US \$120pt is required for an IRR of 15%.

Figure 22.3 Sensitivity of NPV to Coal Price (Canadian Dollars)



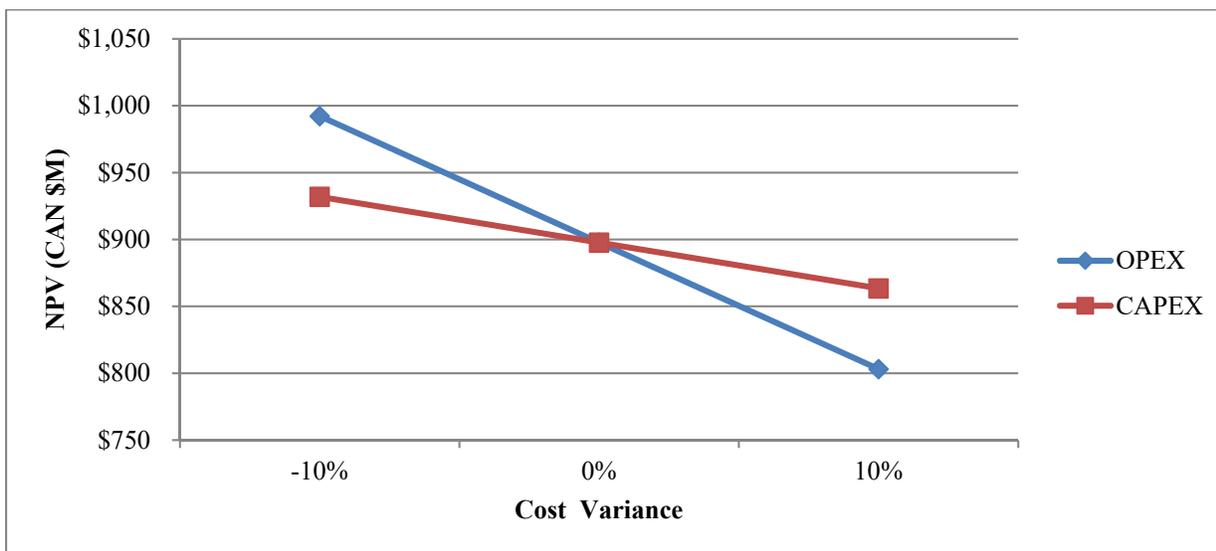
Economic Analysis

Figure 22.4 Sensitivity of NPV to Coal Price (US Dollars)



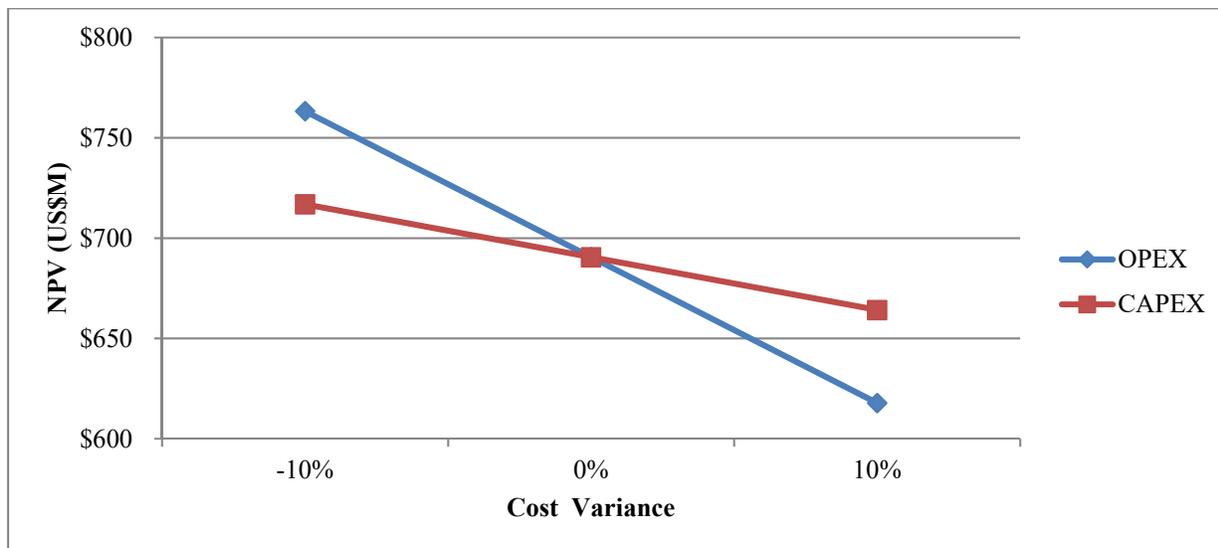
The sensitivity of NPV to variances in operating and capital costs (\$ per clean tonne) is shown on Figures 22.5 and 22.6. This analysis suggests that project economics might be more sensitive to operating costs than to capital costs.

Figure 22.5 Sensitivity of NPV to Cost Variances (Canadian Dollars) at 7.5% discount rate



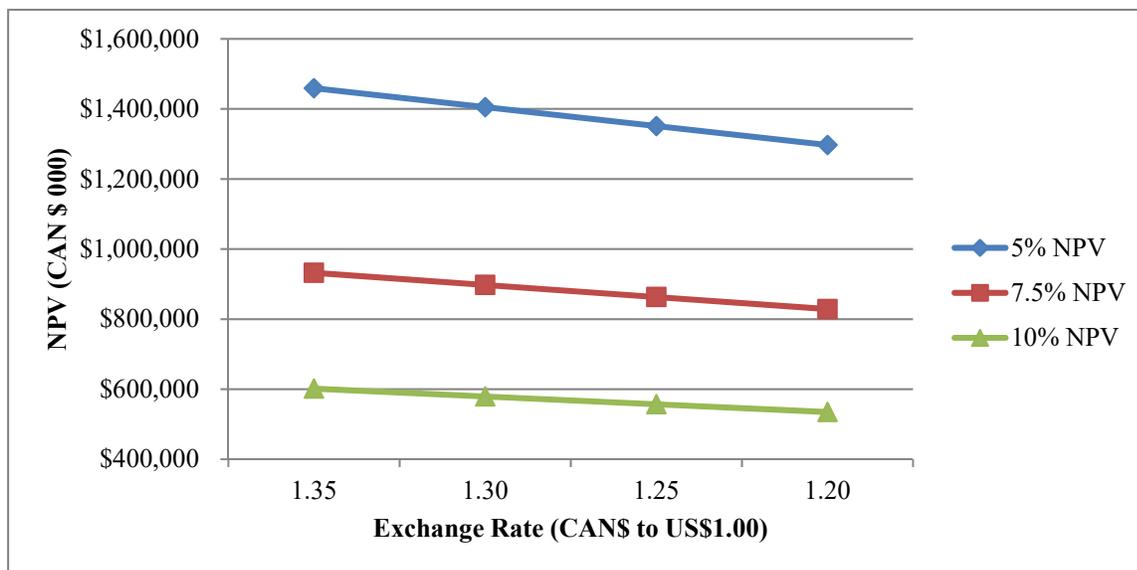
Economic Analysis

Figure 22.6 Sensitivity of NPV to Cost Variances (US Dollars) at 7.5% discount rate



The sensitivity in Canadian dollars of the various NPV scenarios due to variances in exchange rate is shown on Figures 22.7.

Figure 22.7 Sensitivity of NPV to Exchange Rates (Canadian Dollars)



Adjacent Properties

23.0 ADJACENT PROPERTIES

The Flatbed Property lies within a geological trend that contains a number of contiguous historical and operating metallurgical coal mines and properties. Colonial did not rely on resource estimates or other information from other nearby operations or properties.



Other Relevant Data and Information

24.0 OTHER RELEVANT DATA AND INFORMATION

Excluded from the scope of work for this report was the independent verification by Stantec of leases, deeds, agreements of sale, surveys or other property control instruments. Colonial has represented to Stantec that Colonial controls surface rights and mineral rights for the property indicated on the property maps in this report, and Stantec has accepted these as being a true and accurate depiction of the surface and mineral rights owned/controlled by Colonial.



25.0 INTERPRETATION AND CONCLUSIONS

The effective date for this report is November 12, 2018. The principal sources of data concerning geology, drilling, coal quality testing, and many other technical aspects, were obtained from Colonial and publicly available sources.

The geology type for the property was classified as Moderate, based on GSC Paper 88-21 (Hughes, et al, 1989) criteria. The Deposit Type is categorized as an underground mineable deposit. Verification of the exploration historic records of the geology was achieved by data review and site inspections. Coal resources were reported from a geologic model constructed from the exploration results.

The exploration drilling and other exploration data supports the assessment that 298Mt of coal resources are classified as Inferred. The coal resources are identified as having coking properties after beneficiation. Seams D and G are classified as HCC, Seam B and Zone F as SHCC and Seams J and K, while originally considered to yield a potential semi-soft product, are now viewed as Premium PCI coals.

25.1 RISKS AND UNCERTAINTIES

Risks and uncertainties that may affect the reliability or confidence of the geologic resource estimate include geological factors such as geometry of the major thrust faults that may truncate the coal seams at depth, variations in the attitude of coal seams at depth and potential variations in coal seam thickness between points of observation.

Risks and uncertainties that may affect the reliability or confidence of the findings of the PEA, as reported in Sections 16 through 22, include the following:

- This potential PEA study includes classification of Inferred resources within the underground mine plan areas. The geologic nature of Inferred mineral resources is too speculative to have economic consideration applied to them enabling them to be categorized as mineral reserves. The Gordon Creek Project mineral resources must be better defined by increasing confidence in the mine plan areas.
- Currently, approximately 100% of the mine plan ROM tonnes have the classification of Inferred Resources. Further exploration will be required to move all the Inferred resources into Measured and Indicated classifications that are potentially mineable.
- The ability to attract, train, and retain a skilled and efficient workforce is uncertain and most likely will be challenging.
- The potential of methane-related issues relative to this resource depth is not defined. Methane liberation rate impacts ventilation system design and degasification requirements that may impact productivity and personnel safety. The design, however, for this preliminary review assumes a case of manageable levels of methane. Additional drilling should include desorption testing on the coal seams, along with the sandstones in projected longwall panel areas to determine the methane liberation rates for potential mining. The risk potential of higher methane concentrations in the coal seams could require degasification, and additional shaft installations to manage methane generated from mining.
- The PEA is based upon the use of longwall mining as the main recovery method. Presently, there are no longwall mines operating in Western Canada. However, several companies (HD Mining – Murray River, Grande Cache Coal, and Glencore) are investigating the introduction of longwall equipment in Western Canada. HD Mining is currently in the process of getting Chinese underground equipment certified for use in BC. The preliminary economic review of this project assumes the lower cost Chinese equipment would be completely



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Interpretation and Conclusions

approved for use in BC. If more expensive equipment from different vendors were to be required, then the project economics would be negatively impacted.

- The PEA includes a basic geotechnical design review for the layout and mining of the multiple seams in this resource area. For more advanced mining studies to Pre-Feasibility and Feasibility level, additional geotechnical testing of the coal seams will be necessary to complete a finite element analysis of the multiple seam mine layouts. This would identify areas of concern where pillar support may require modification to mitigate mining risk. The additional geotechnical information and interpretation has the likely potential to reduce recoverable resources and reserves.
- The PEA utilizes the CMRR results completed and presented in the Memorandum – 2017 Flatbed Coal Project – Gordon Creek Area Geotechnical Core Logging Summary, (Norwest, 2018b). CMRR values for Seams G and J indicate lower quality roof strengths. Mining these two seams at depths greater than 300m will require reducing cut depths, thus lowering productivity, narrowing entry openings, and increasing secondary support in intersections and entries in long term roadways. Expected ground control costs would be significantly higher in these two seams. Economic evaluation determines that the planned recovery of these two seams is 5.43 million ROM tonnes (approximately 2.28 million clean tonnes) in Seam G and 16.17 million ROM tonnes (approximately 10.73 million clean tonnes) in Seam J.
- The PEA mine plan has not accounted for the potential for significantly more water ingress from surface and subsurface water aquifers. Although current exploration drilling in the project area did not identify significant inflows of water from formations above the coal seams, there is the potential for more water ingress into mine workings than is currently released in this PEA-level mining study. For more advanced mining studies there should be enough hydrologic information acquired from additional drilling and mapping programs for the development of a theoretical water management plan for the Property.

25.2 CONCLUSIONS

Based upon the available information, it is concluded that:

- Exploration undertaken by Colonial provides a reliable compilation of geology, resource potential and coal quality for the property as indicated by the exploration results.
- The Gordon Creek deposit has a coal resource with coal quality amenable to servicing the metallurgical coal market as hard and semi hard coking products and as a premium PCI product.



Recommendations

26.0 RECOMMENDATIONS

Based upon the results achieved to date, further work on the Gordon Creek deposit is recommended. The main elements of additional and exploration are outlined below.

26.1 EXPLORATION

26.1.1 Drilling

It is recommended that a further 4-5 drillholes be completed within the Gordon Creek deposit to:

- Refine the structural geological interpretation of the deposit and hence the geological model.
- Allow an increase in resource confidence from Inferred to Measured plus Indicated.
- Confirm and infill coal quality data across the deposit.
- Acquire sufficient coal samples from each seam to conduct initial carbonization tests.
- Conduct further geotechnical studies on rock cores.
- Undertake initial coal seam gas content determinations

The drilling would include a combination of trail and helicopter accessible drillholes.

26.1.2 Geophysical Surveys

It is recommended that a 2D seismic survey, designed to identify and trace coal seams, and any shallow geological structures that might affect the Gates coal measures, be carried out over the Gordon Creek deposit. It is estimated that approximately 10km of seismic lines would be required.

26.1.3 Additional Regional Data

It is recommended an initial, 2D seismic survey, designed to identify and trace coal seams and geological structures, be carried out over the eastern anticline target together with a detailed geological mapping program. It is estimated that approximately 5km of seismic lines would be required.

26.1.4 Exploration Budget

Based upon the above, and assuming a 5-hole drill program, the estimated budget for the recommended work at Gordon Creek will total approximately CAN \$2.6M. A detailed breakdown of the estimated budget can be found below in Table 26.1.



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Recommendations

Table 26.1 Flatbed Exploration Budget

Component	Cost (CAN \$)
Drilling Operations	\$760,000
Geophysical Logging	\$46,000
Coal Quality	\$300,000
Helicopter/Trails	\$210,000
Field and Office Personnel	\$240,000
Geotechnical Evaluation	\$40,000
Coal Seam Gas Content Evaluation	\$65,000
Room and Board	\$70,000
Rental Vehicles	\$30,000
Materials and Supplies	\$18,000
Consultants	\$30,000
Geological Model Update/Resource Reporting	\$40,000
Geophysical Surveys (2D Seismic)	\$310,000
Additional regional data compilation	\$160,000
Reporting/PEA Up-Date	\$45,000
Contingency 10%	\$236,400
Total	\$2,600,400

The proposed program, if successful, could provide information to support a prefeasibility-level study that may define coal reserves in the Proven plus Probable categories.

26.2 GEOTECHNICAL EVALUATION

Stantec recommends additional geotechnical evaluation need to be completed within the identified mineable areas of the seams identified. This information needs to be utilized in a multiple finite element analysis for pillar design and multiple seam mining stresses that will assist in determining recoverability of the seams and help establish reserves in the future.

26.3 DESORPTION TESTING

Additional drill on the mineable areas needs to include desorption test as part of the plans. With longwall mining being proposed in this PEA, Stantec recommends that all coal seams planned to be mined along with the coals and interburden rock that will be collapsed by longwall mining be tested for methane. These results will be necessary to determine what methane liberation is present both in depth and lithology, so a degasification plan and the cost impacts can be determined in advancing this property to a pre-feasibility level.



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27.0 REFERENCES

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TECHNICAL REPORT PRELIMINARY ECONOMIC ASSESSMENT FOR THE GORDON CREEK DEPOSIT - FLATBED COAL PROPERTY, BRITISH COLUMBIA

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Illustrations

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Figure 4.3 Project Area Location Map

Figure 4.4 Coal License Map

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Illustrations

28.0 ILLUSTRATIONS

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Figure 16.3 Seam D Projected Underground Mine Layout

Figure 16.4 Zone F Projected Underground Mine Layout

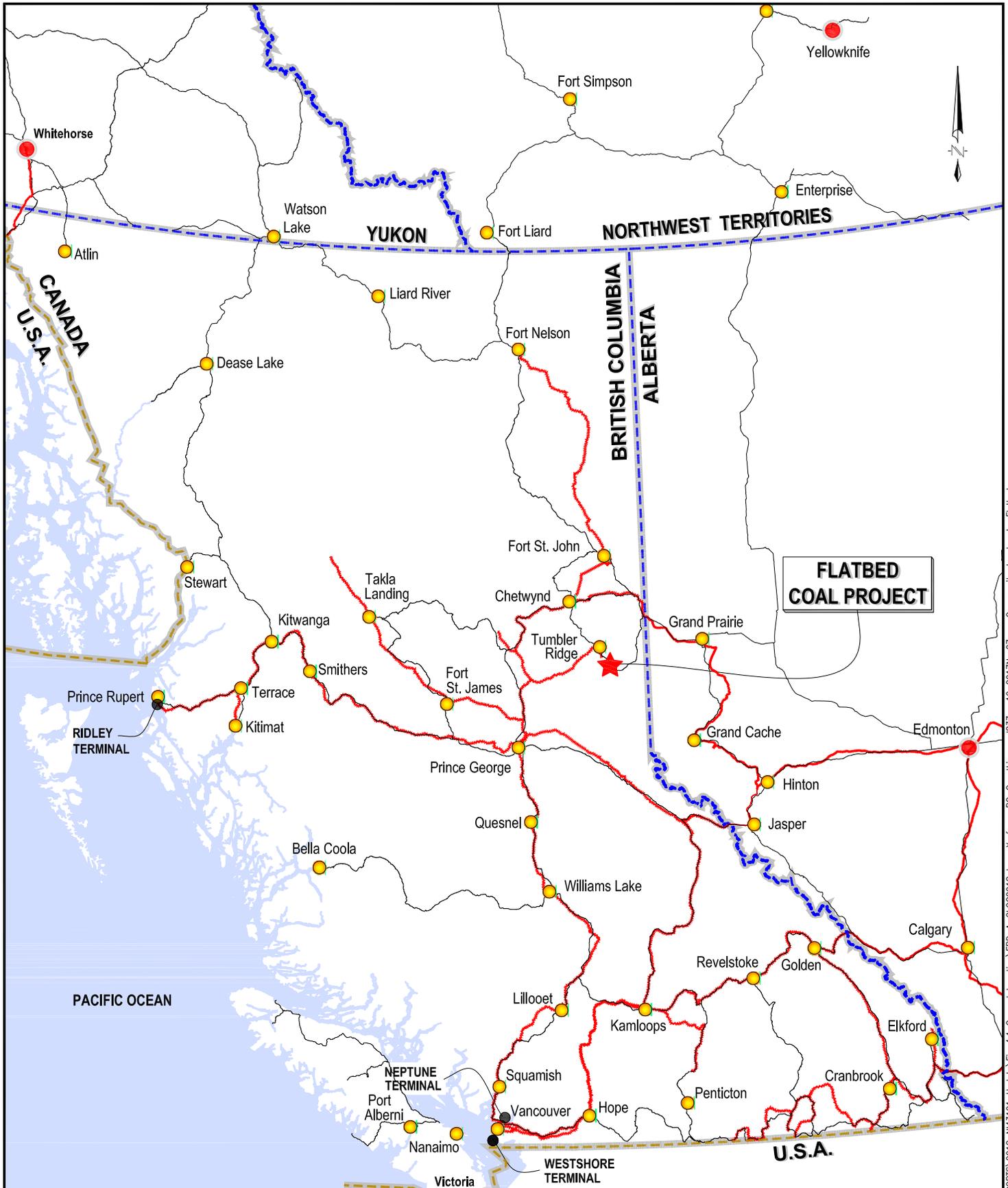
Figure 16.5 Seam G Projected Underground Mine Layout

Figure 16.6 Seam J Projected Underground Mine Layout

Figure 16.7 Seam K Projected Underground Mine Layout

Figure 18.1 Conceptual Trucking Routes & Rail Loadout Location





**FLATBED
COAL PROJECT**

LEGEND:

- Road
- Railway
- Provincial / International Boundary
- City / Town
- Coal Terminal
- Provincial / Territorial Capital

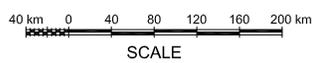


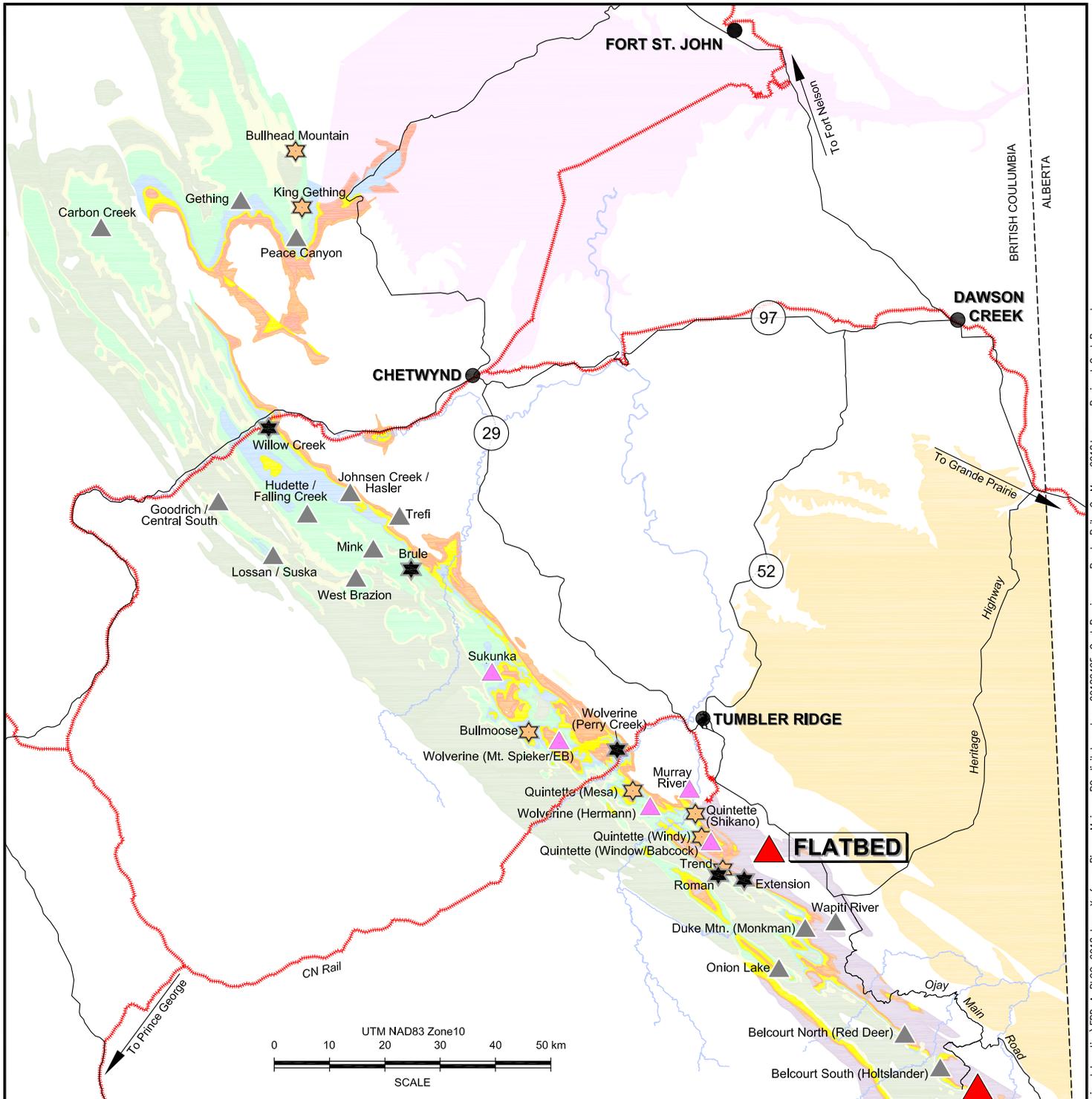
FIGURE 4.1

COLONIAL COAL INTERNATIONAL CORP.
FLATBED COAL PROJECT

General Location Map

DATE: Dec 19, 2018	SCALE: As Shown	
FILE: FBD-A-GLOCC2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

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LEGEND:

- Road
- Railway
- Town
- Existing Coal Mines (Producing, Care & Maintenance)
- Past Producer
- Advanced Development Projects
- Colonial Coal Projects
- Regional Coal Deposits

Coal Bearing Formation:

- Boulder Creek
- Hulcross
- Gates
- Moosebar
- Gething
- Cadomin
- Minnes Group
- Wapiti

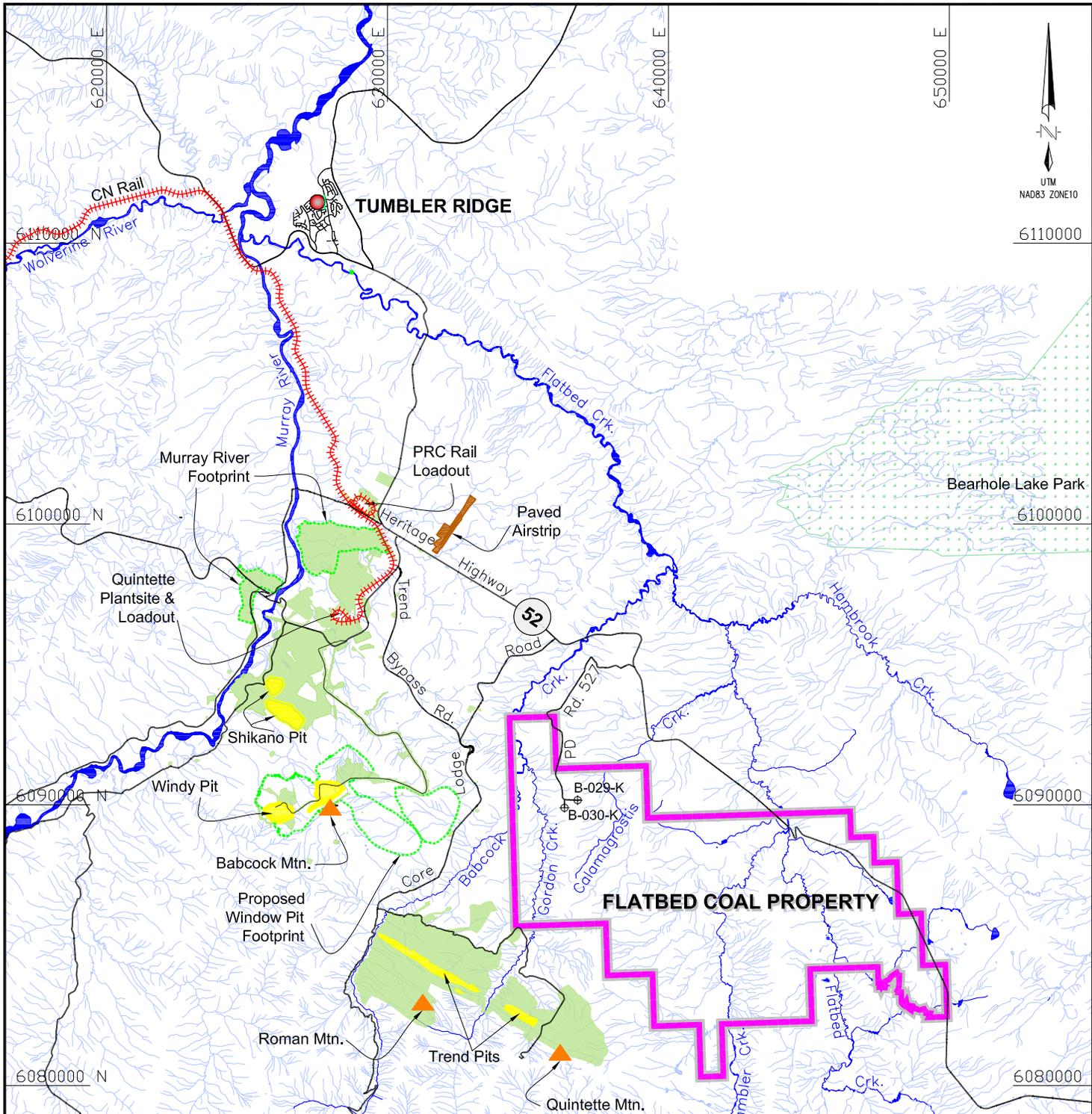
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<http://www.empr.gov.bc.ca/Mining/Geoscience/MapPlace/geoData>
 BC Digital Geology updated 2018-04-05

FIGURE 4.2

COLONIAL COAL INTERNATIONAL CORP.
FLATBED COAL PROJECT

Regional Location Map

DATE: Dec 19, 2018	SCALE: As Shown	
FILE: FBD-A-RLOC-2018	DRAWN BY: CVS	
CHECKED BY: JHP / DJL	APPROVED BY: JHP / DJL	



LEGEND:

- Coal Property Boundary
- Roads
- Rivers/Creeks
- Existing Pit Area
- Mine & Facilities Footprint
- Proposed Mine Footprint
- Gas Well

0 2 4 6 8 10 km
SCALE

FIGURE 4.3

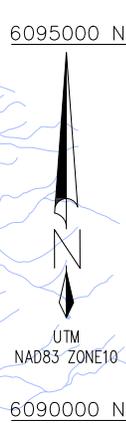
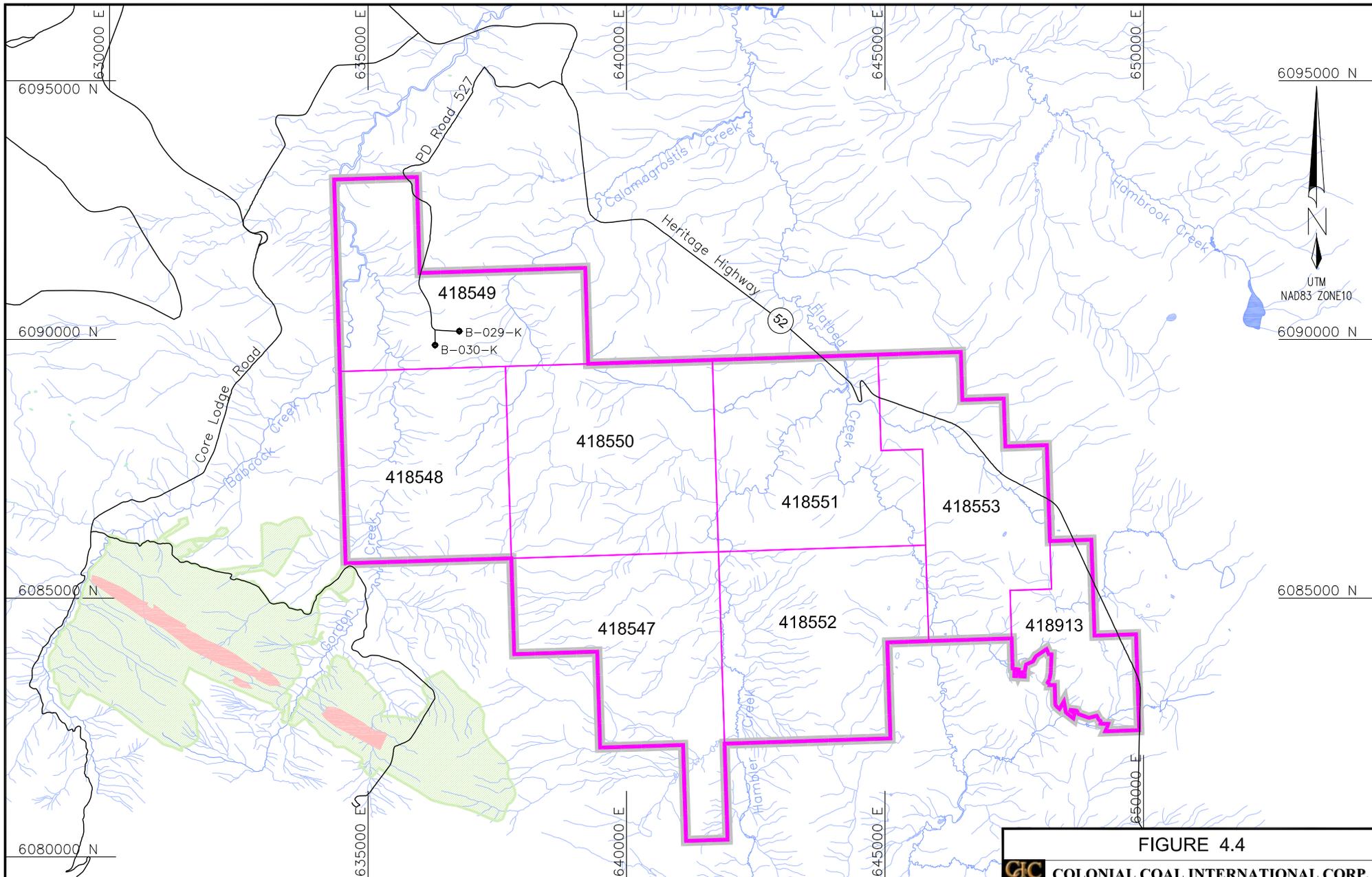
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Project Area Location Map

DATE: Dec 19, 2018	SCALE: As Shown	
FILE: FBA-PALOC-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

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LEGEND:

- Coal License Boundary
- Road
- River/Creek
- ▨ PRC Trend Mine
- Old Gas Well

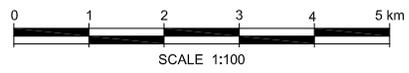


FIGURE 4.4	
COLONIAL COAL INTERNATIONAL CORP.	
FLATBED COAL PROJECT	
Coal License Map	
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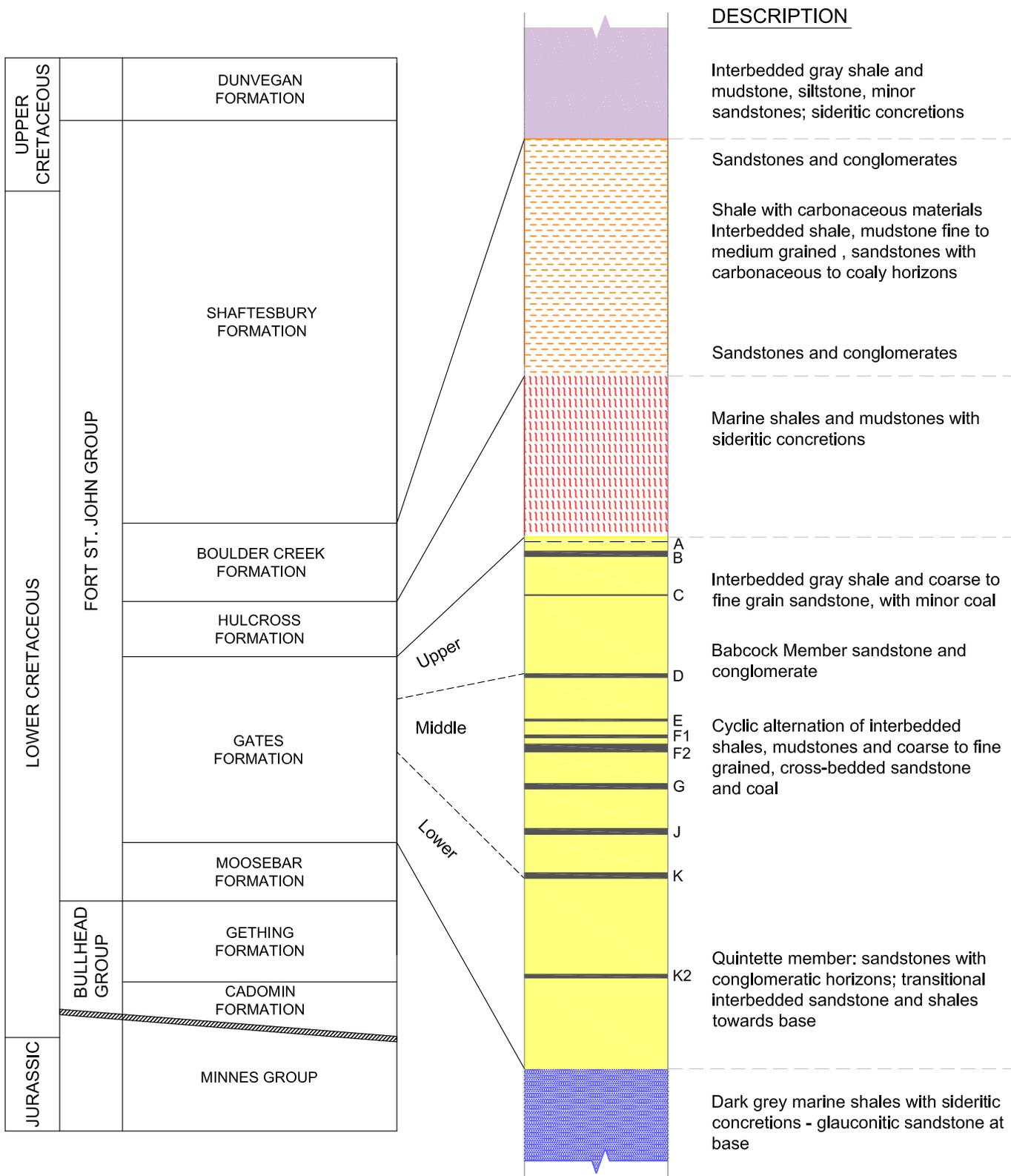
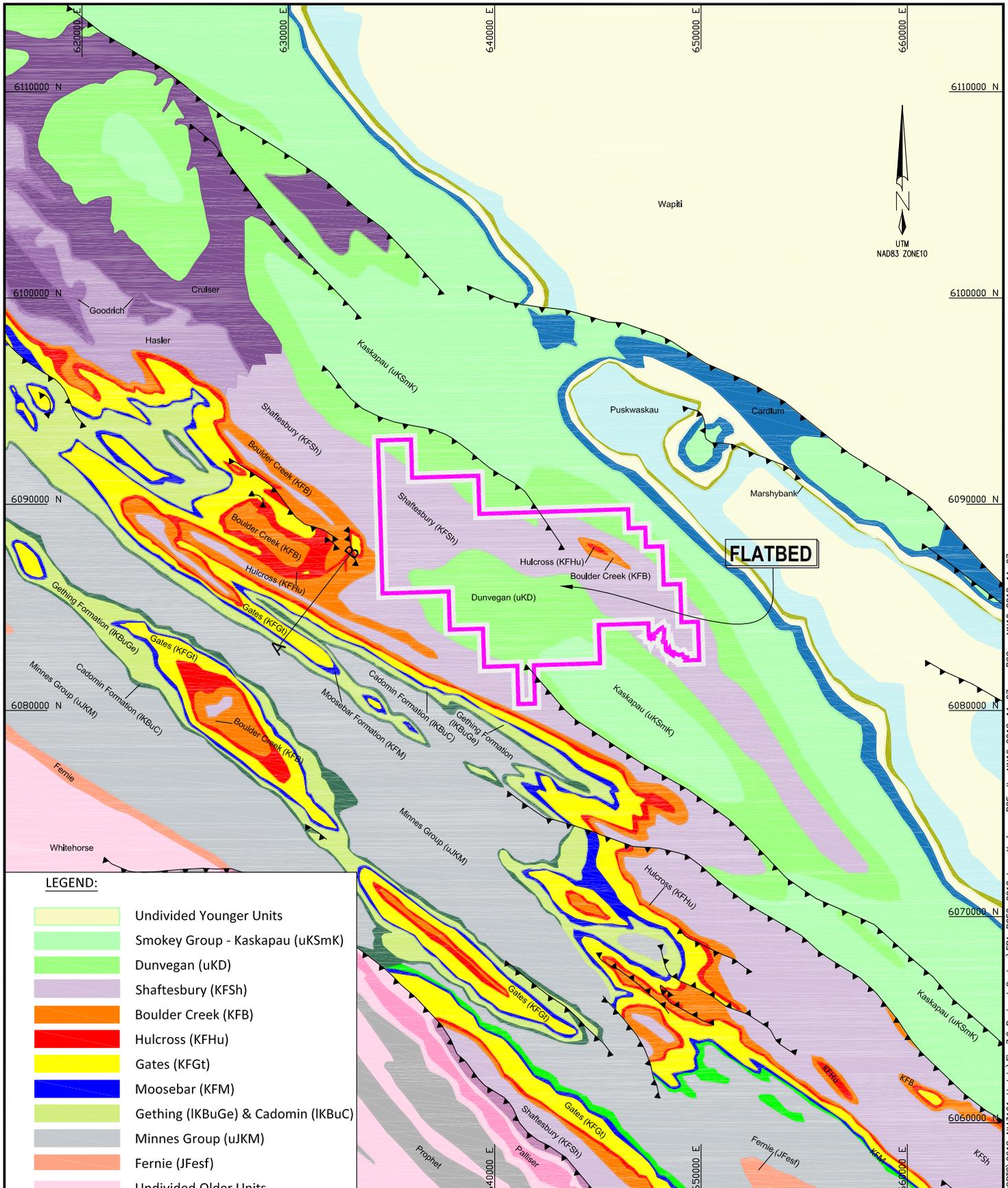


FIGURE 7.1

 COLONIAL COAL INTERNATIONAL CORP.	
FLATBED COAL PROJECT	
Generalized Stratigraphic Column	
DATE: DEC 19, 2018	SCALE: As Shown
FILE: FB-A-GENSTR-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
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LEGEND:

- Undivided Younger Units
- Smokey Group - Kaskapau (uKSmK)
- Dunvegan (uKD)
- Shaftesbury (KFSh)
- Boulder Creek (KFB)
- Hulcross (KFHu)
- Gates (KFGt)
- Moosebar (KFM)
- Gething (IKBuGe) & Cadomin (IKBuC)
- Minnes Group (uJKM)
- Fernie (JFesf)
- Undivided Older Units
- Rundle Group
- Spray River Group
- Perdrix
- Fault-Thrust
- Property Boundary

FIGURE 7.2

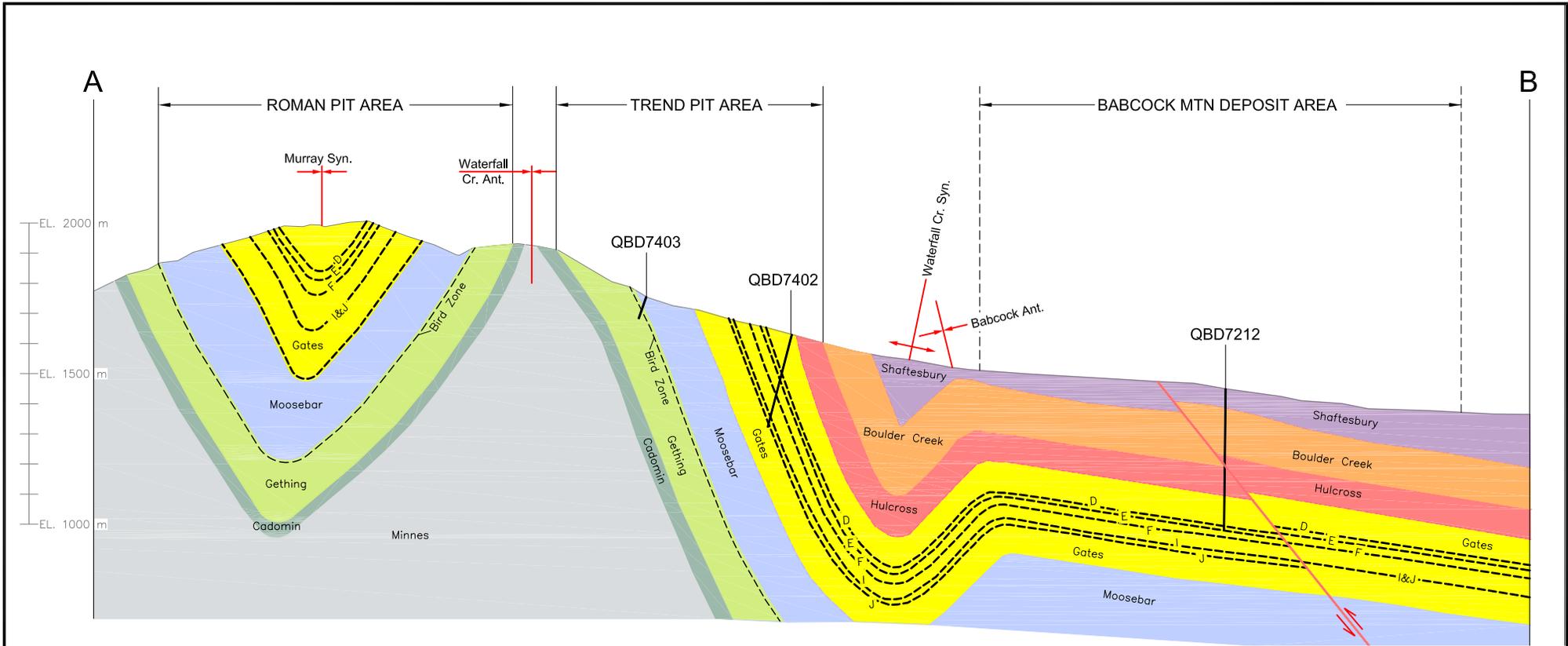
COLONIAL COAL INTERNATIONAL CORP.
FLATBED COAL PROJECT

Regional Geology Map

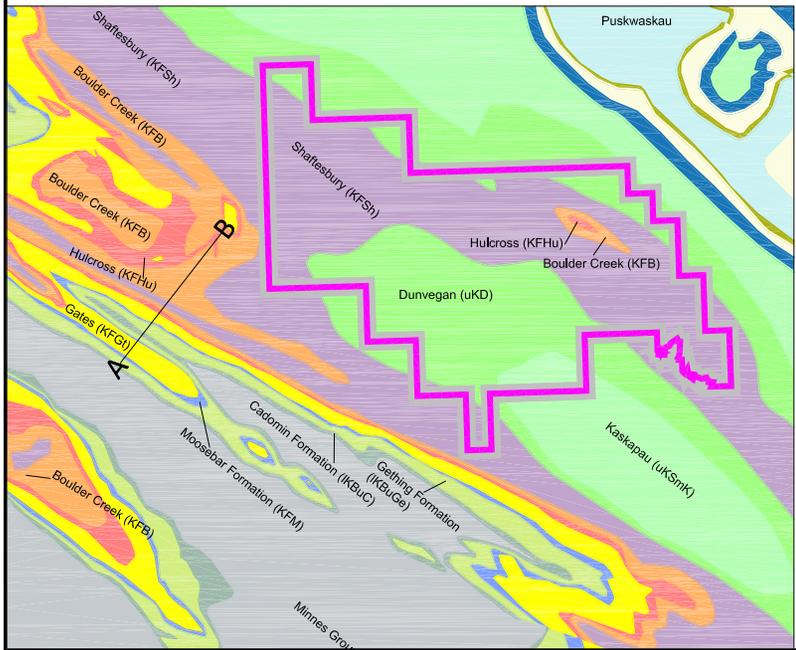
DATE: Dec 19, 2018	SCALE: As Shown	
FILE: FBA-RGEO-2018	DRAWN BY: CVS	
APPROVED BY: JHP / DJL		

Reference: <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/GeoFiles/Pages/2005-6.aspx>
 & GM2003-2 (Legun 2003)

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Note:
Taken from Perry (2004)



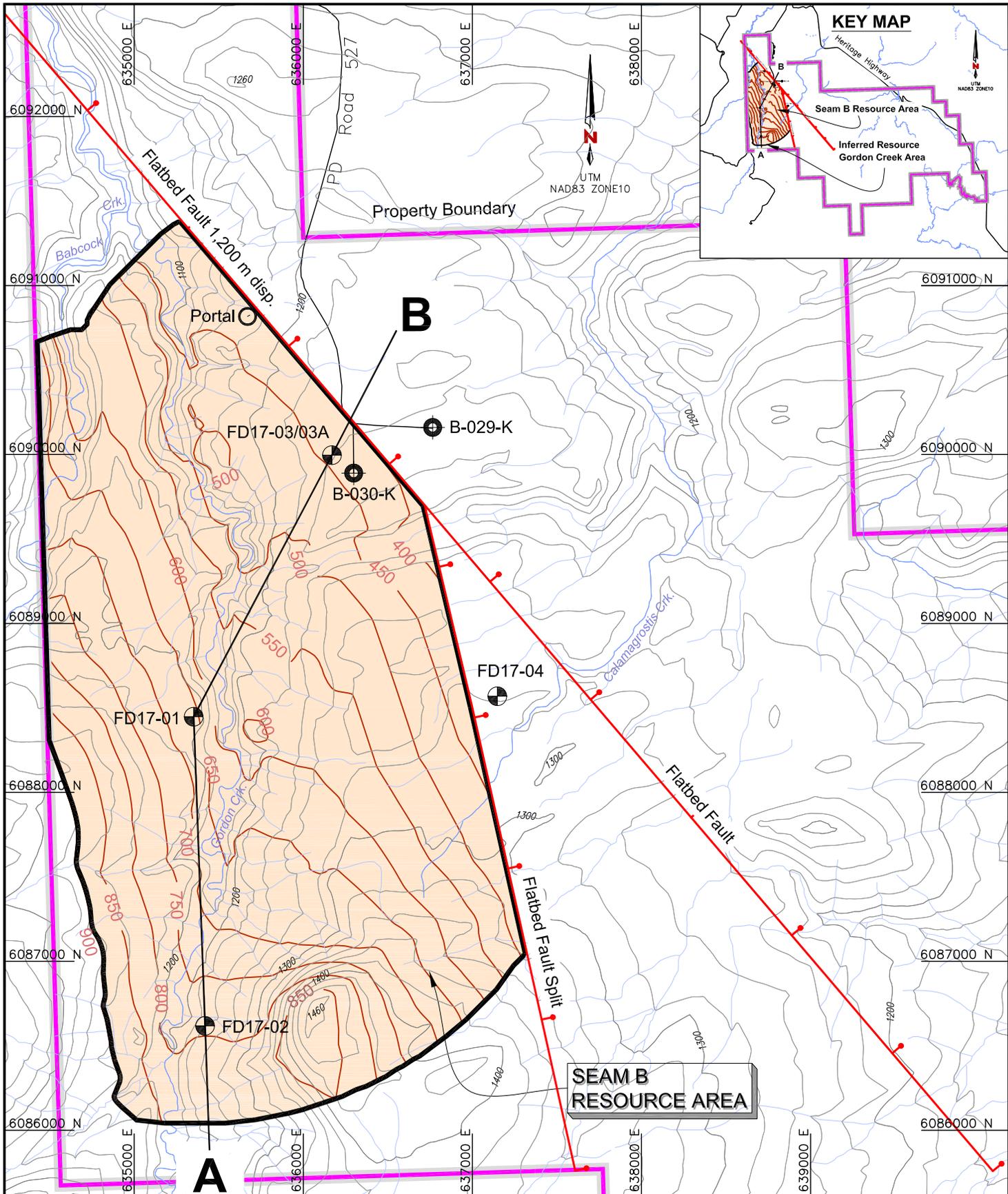
LEGEND:

- Shaftesbury (KFSH)
- Boulder Creek (KFB)
- Hulcross (KFHu)
- Gates (KFGt)
- Moosebar (KFM)
- Gething (IKBuGe)
- Cadomin (IKBuC)
- Minnes Group
- Bird Zone
- Coal Seam
- Fault

FORMATION

- Shaftesbury (KFSH)
- Boulder Creek (KFB)
- Hulcross (KFHu)
- Gates (KFGt)
- Moosebar (KFM)
- Gething (IKBuGe)
- Cadomin (IKBuC)
- Minnes Group
- Bird Zone
- Coal Seam
- Fault

FIGURE 7.3		
COLONIAL COAL INTERNATIONAL CORP.		
FLATBED COAL PROJECT		
Regional Schematic Cross Section		
DATE: Dec 20, 2018	SCALE: As Shown	
FILE: FBA-SCHEMSEC-2018	DRAWN BY: CVS	
CHECKED BY: JHP / DJL	APPROVED BY: JHP / DJL	



LEGEND:

	Colonial Coal Drillhole		Seam B Resource Area
	Old Gas Well		Overburden Contours
	River/Creek		Fault (downtrown side indicated)
	Topography		Property Boundary
	Road		

0 200 400 600 800 1000 m
SCALE

FIGURE 7.4

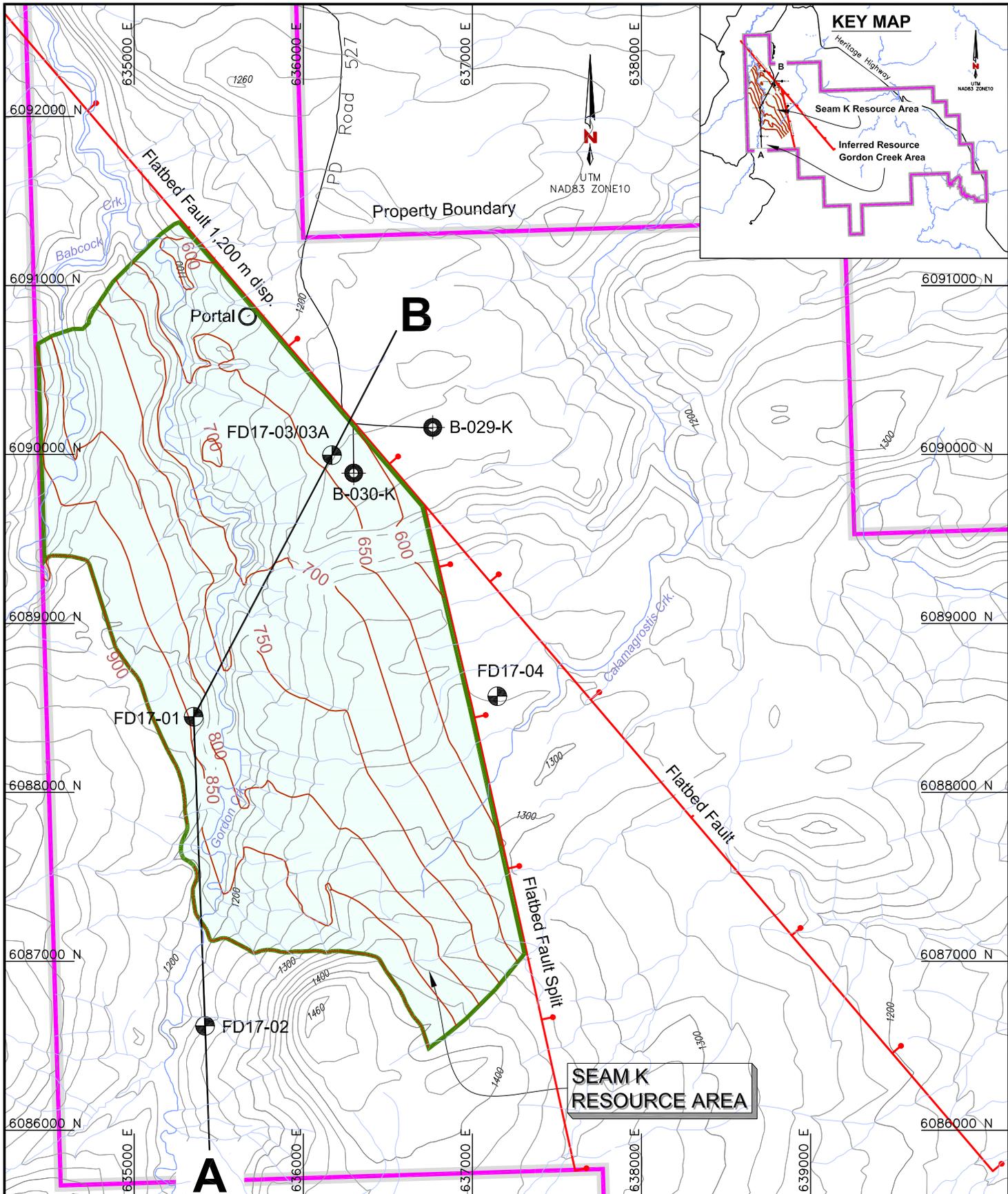
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam B Overburden Contours

DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-SMB-OVB-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
APPROVED BY: JHP / DJL	

12/20/18 - 11:12:36am K:\FLATBED\REPORTS\2018_N43101_Update\Fig 7.4 Sm B OVB Contours\FBA-SMB-OVB-2018.dwg Xrefs: X-FB-TRM-Topo X-BCRoads-2018-01-08 X-FBD-TRM-Rivers-2018-12-06 X-Fault-Downthrown



LEGEND:

- Colonial Coal Drillhole
- Old Gas Well
- River/Creek
- Topography
- Road
- Seam K Resource Area
- Overburden Contours
- Fault (downthrown side indicated)
- Property Boundary

0 200 400 600 800 1000 m
SCALE

FIGURE 7.5

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam K Overburden Contours

DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-SMK-OVB-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
APPROVED BY: JHP / DJL	

12/19/18 - 05:39:05pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 7.5 Sm K OVB Contours\FBA-SMK-OVB-2018.dwg Xrefs: X-FB-TRM-Topo X-BCRoads-2018-01-08 X-FBD-TRM-Rivers-2018-12-06 X-Fault-Downthrown

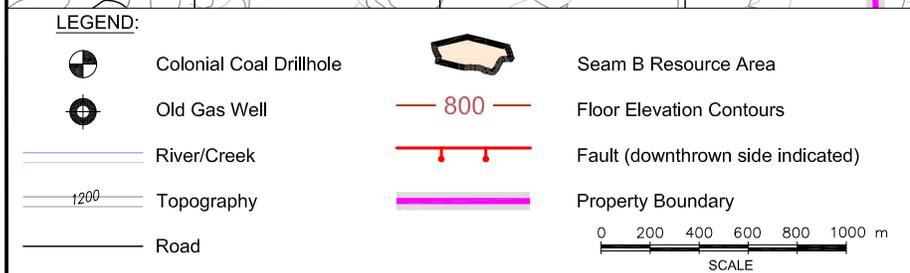
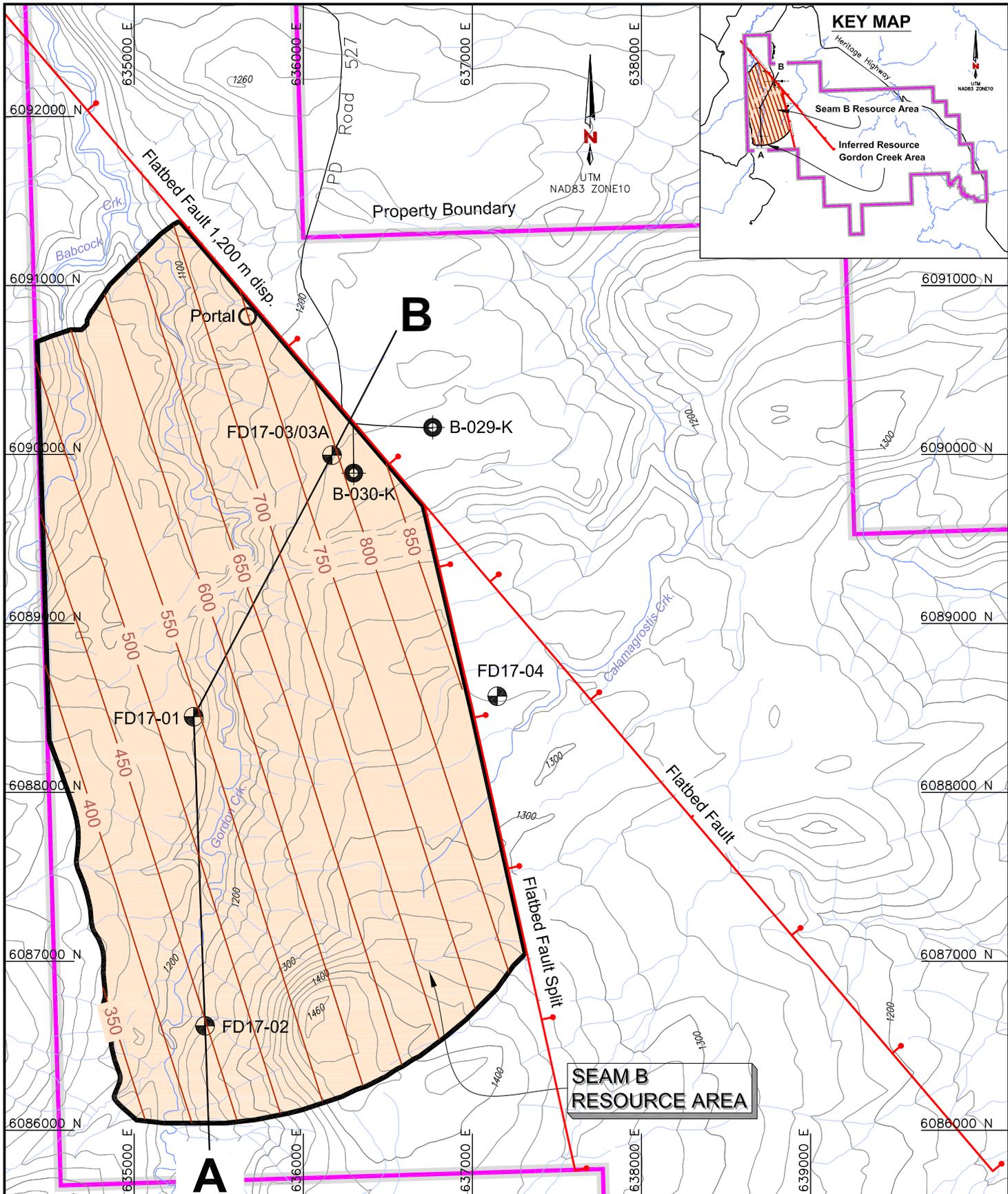


FIGURE 7.6

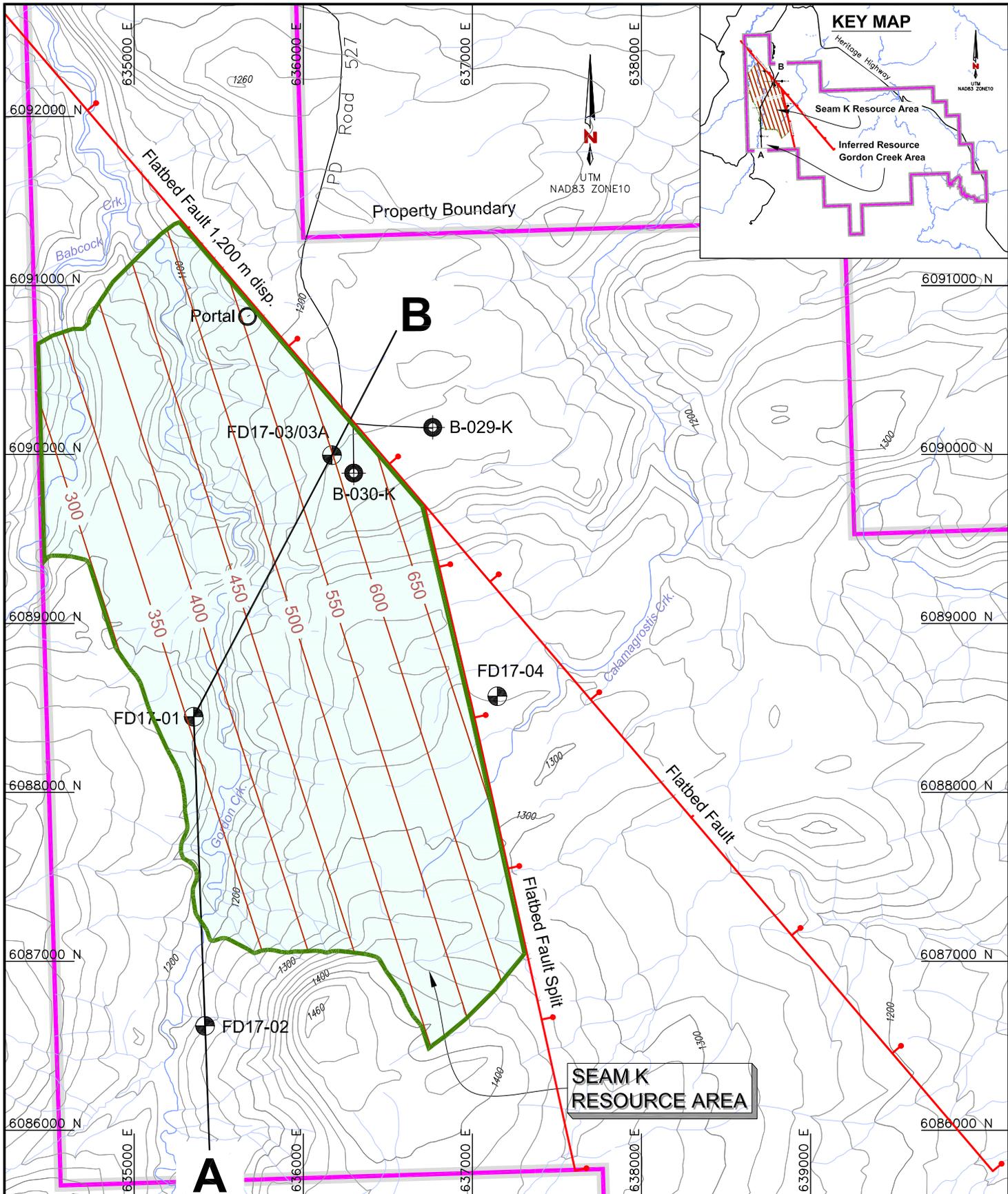
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam B Floor Elevation Contours

DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-SMB-FLR-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
APPROVED BY: JHP / DJL	

12/19/18 - 04:51:46pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 7.6 Sm B Floor Elev Contours\FBA-SMB-FLR-2018.dwg Xrefs: X-FB-TRIM-Topo X-BCRoads-2018-01-08 X-FBD-TRM-Rivers-2018-12-06 X-Fault-Downthrown



LEGEND:

- Colonial Coal Drillhole
- Old Gas Well
- River/Creek
- Topography
- Road
- Seam K Resource Area
- Floor Elevation Contours
- Fault (downthrown side indicated)
- Property Boundary

0 200 400 600 800 1000 m
SCALE

FIGURE 7.7

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

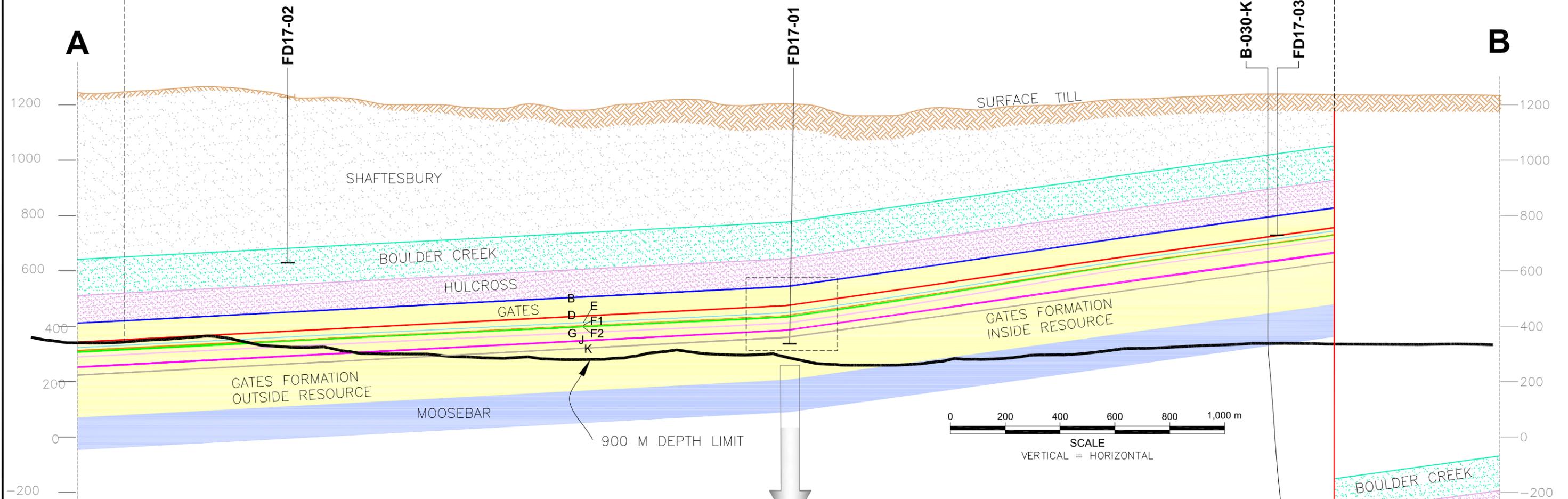
Seam K Floor Elevation Contours

DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-SMK-FLR-2018	
DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

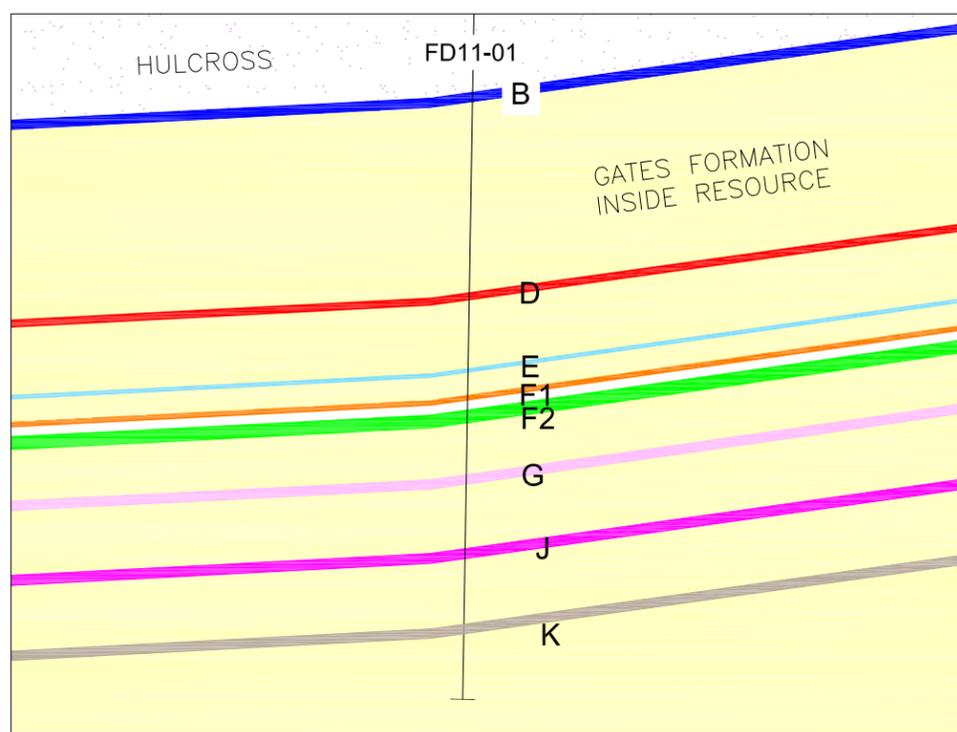
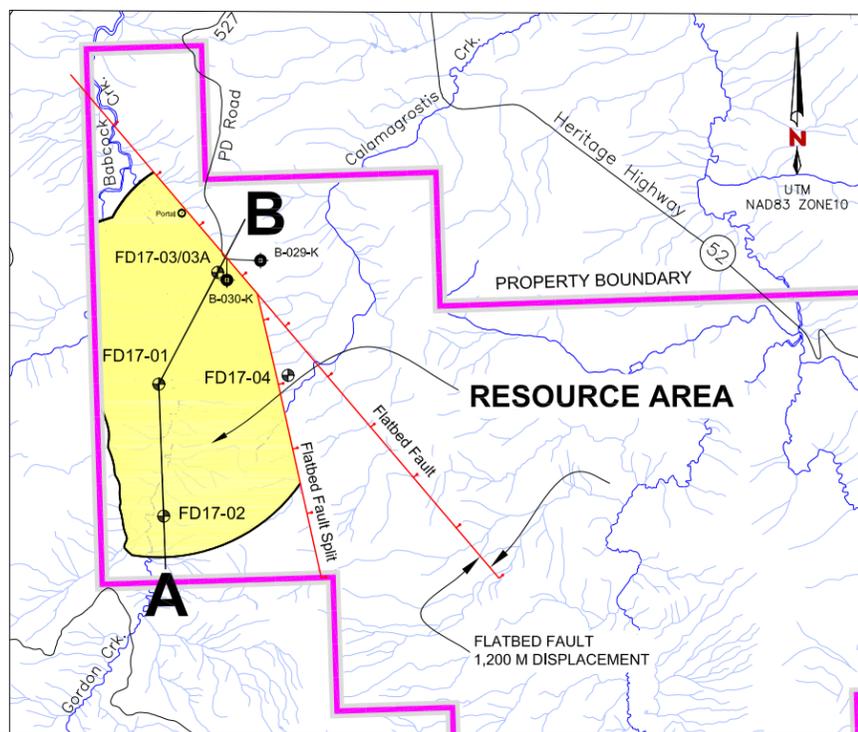
12/19/18 - 05:18:47pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 7.7 Sm K Floor Elev Contours\FBA-SMK-FLR-2018.dwg Xrefs: X=FB-TRIM-Topo X=BCRoads-2018-01-08 X=FBD-TRM-Rivers-2018-12-06 X=Fault-Downthrown

CROSS SECTION A-B

INFERRED RESOURCE RANGE



PLAN VIEW



FLATBED FAULT
1,200 M DISPLACEMENT

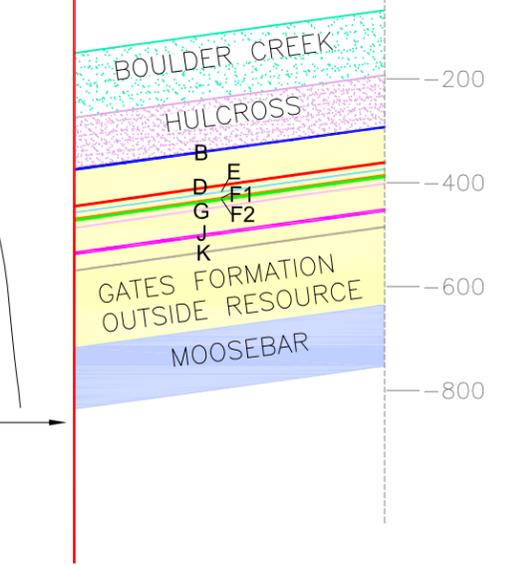
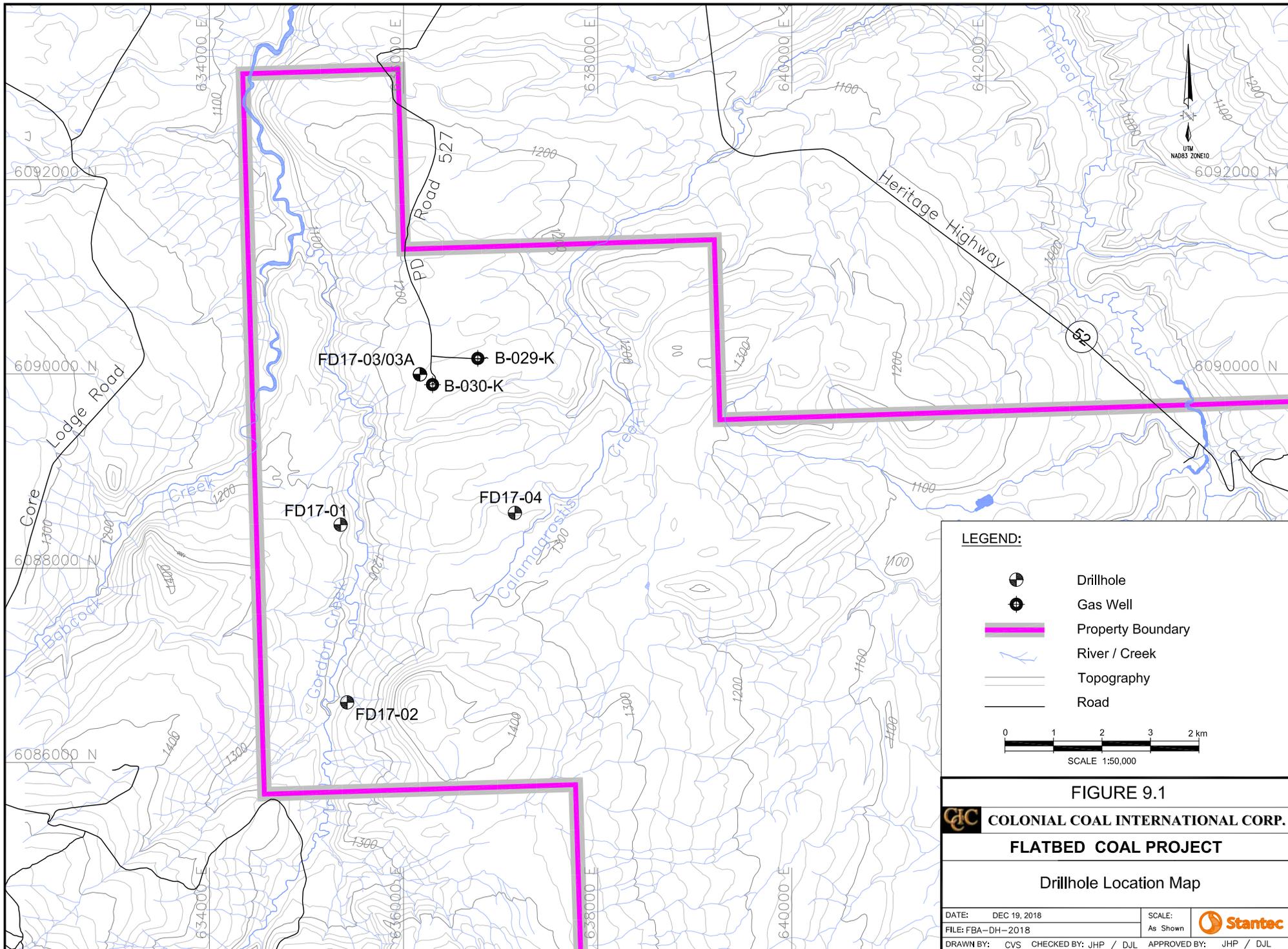


FIGURE 7.8
COLONIAL COAL INTERNATIONAL CORP.
FLATBED COAL PROJECT
 Cross Section A-B

DATE: Dec 20, 2018	SCALE: As Shown	
FILE: FBB-XSECAB-2018	DRAWN BY: CVS	
CHECKED BY: JHP / DJL	APPROVED BY: JHP / DJL	



LEGEND:

- Drillhole
- Gas Well
- Property Boundary
- River / Creek
- Topography
- Road

0 1 2 3 2 km
SCALE 1:50,000

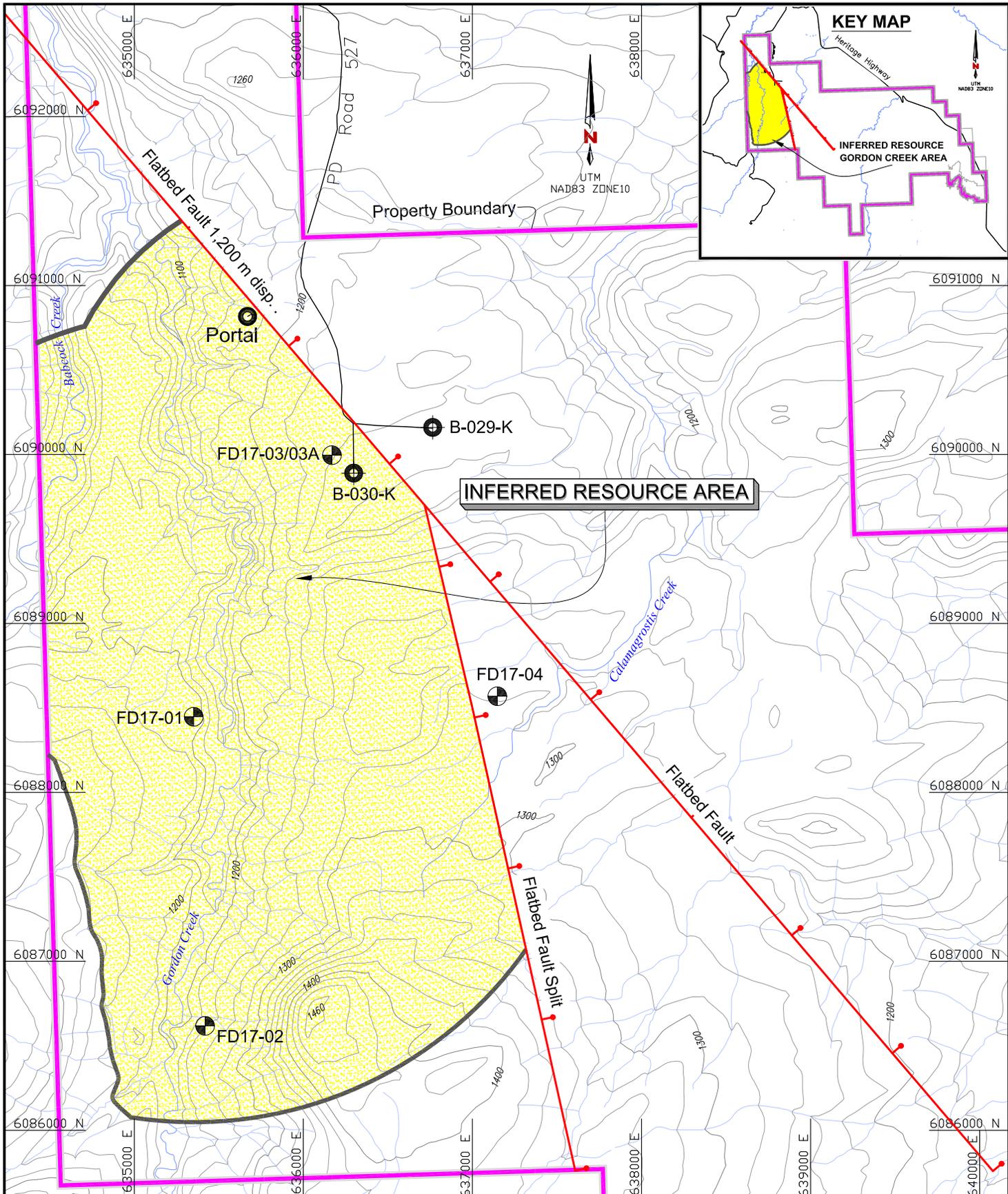
FIGURE 9.1

 **COLONIAL COAL INTERNATIONAL CORP.**

FLATBED COAL PROJECT

Drillhole Location Map

DATE: DEC 19, 2018	SCALE: As Shown	
FILE: FBA-DH-2018		
DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL		



LEGEND:

- Colonial Coal Drillhole
- Old Gas Well
- River/Creek
- Property Boundary
- Topography
- Road
- Inferred Resource Area
- Fault (downthrown side indicated)

0 200 400 600 800 m
SCALE

FIGURE 14.1

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Coal Resource Plan

DATE: Dec 20, 2018	SCALE: As Shown
FILE: FBD-A-COALRES-2018	
DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

12/20/18 - 12:02:56pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 14.1 Coal Resource Plan\FBD-A-COALRES-2018.dwg Xrefs: x-FBD-TRIM-Topo x-BCRoads-2018-01-08 x-Fault-Downthrown

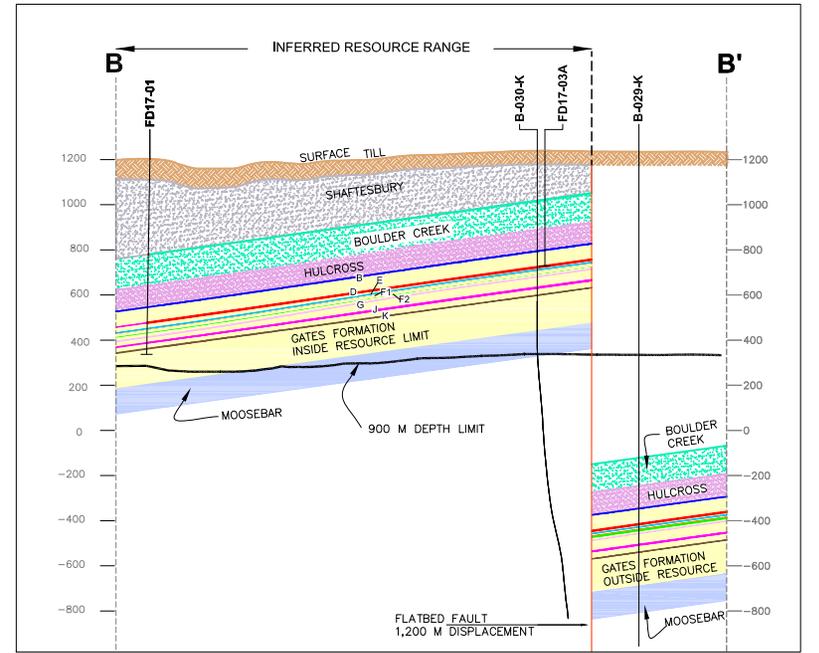
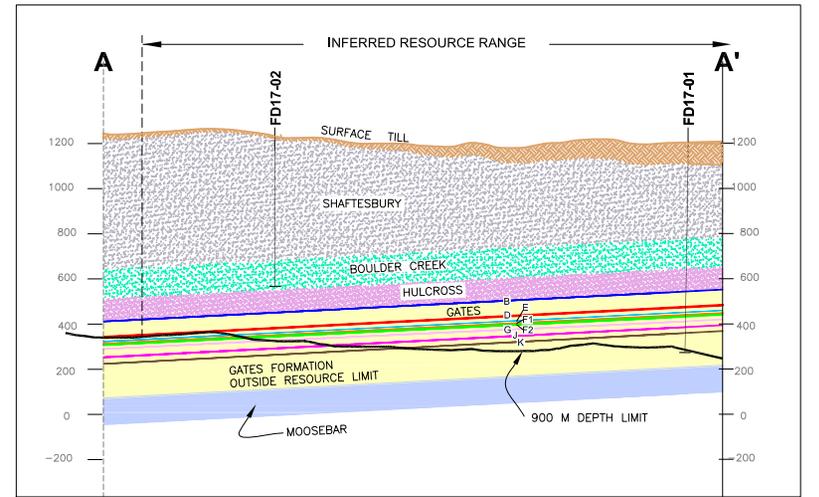
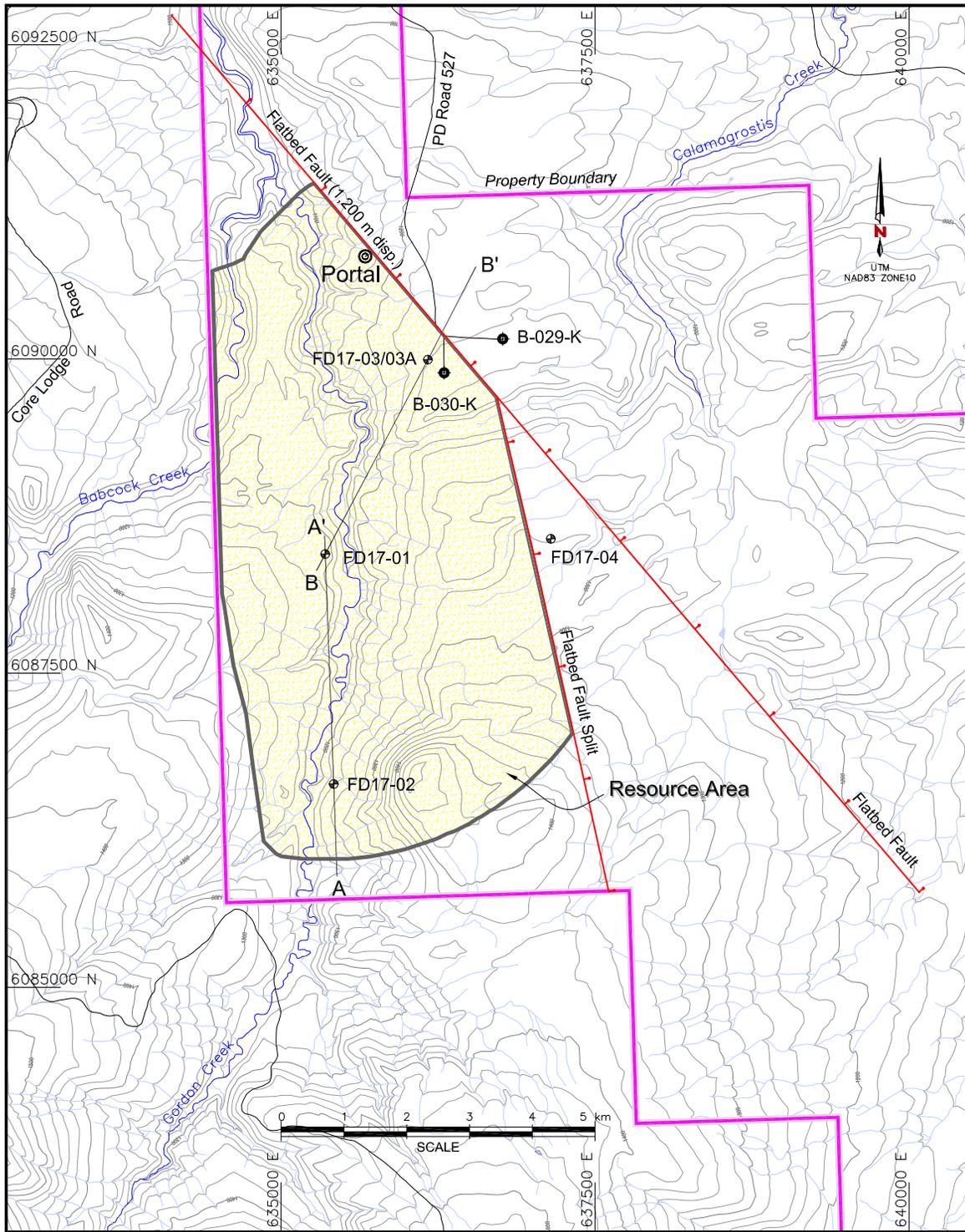


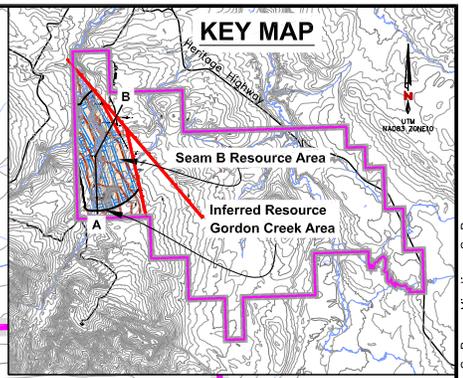
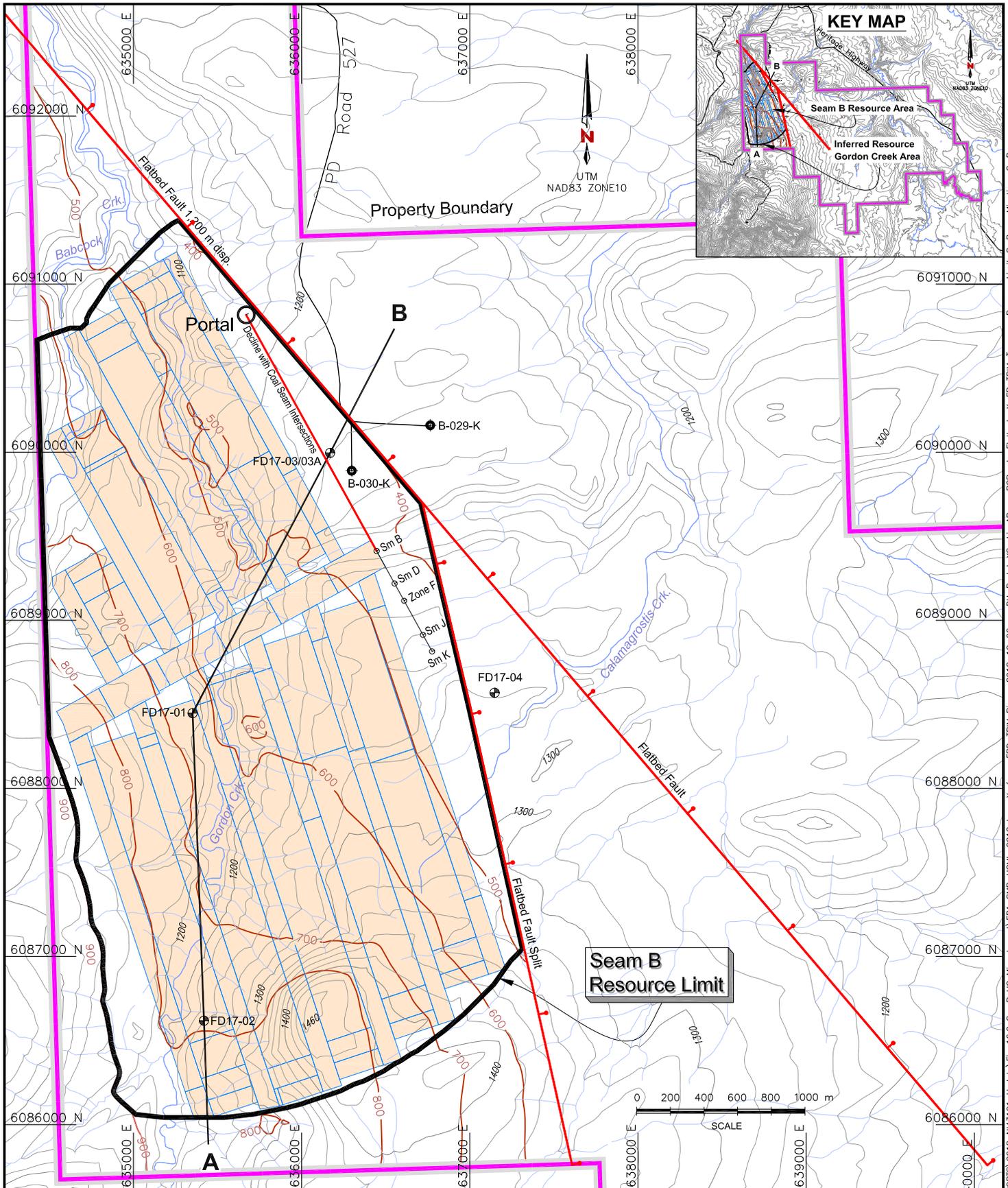
FIGURE 16.1

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Conceptual Mine Area

DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-MINEAREA-2018	
DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	



LEGEND:

	Colonial Coal Drillhole		Seam B Resource Limit
	Old Gas Well		Overburden Isopachs
	River/Creek		Fault (downthrown side indicated)
	Topography		Projected Underground Mine Layout
	Road		Property Boundary

FIGURE 16.2

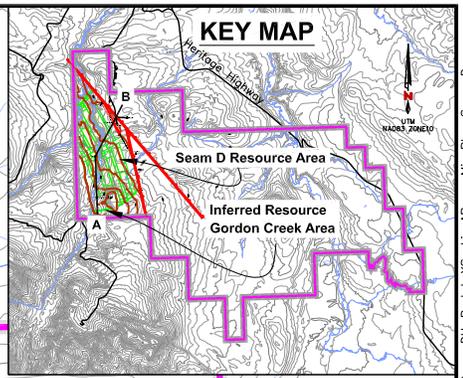
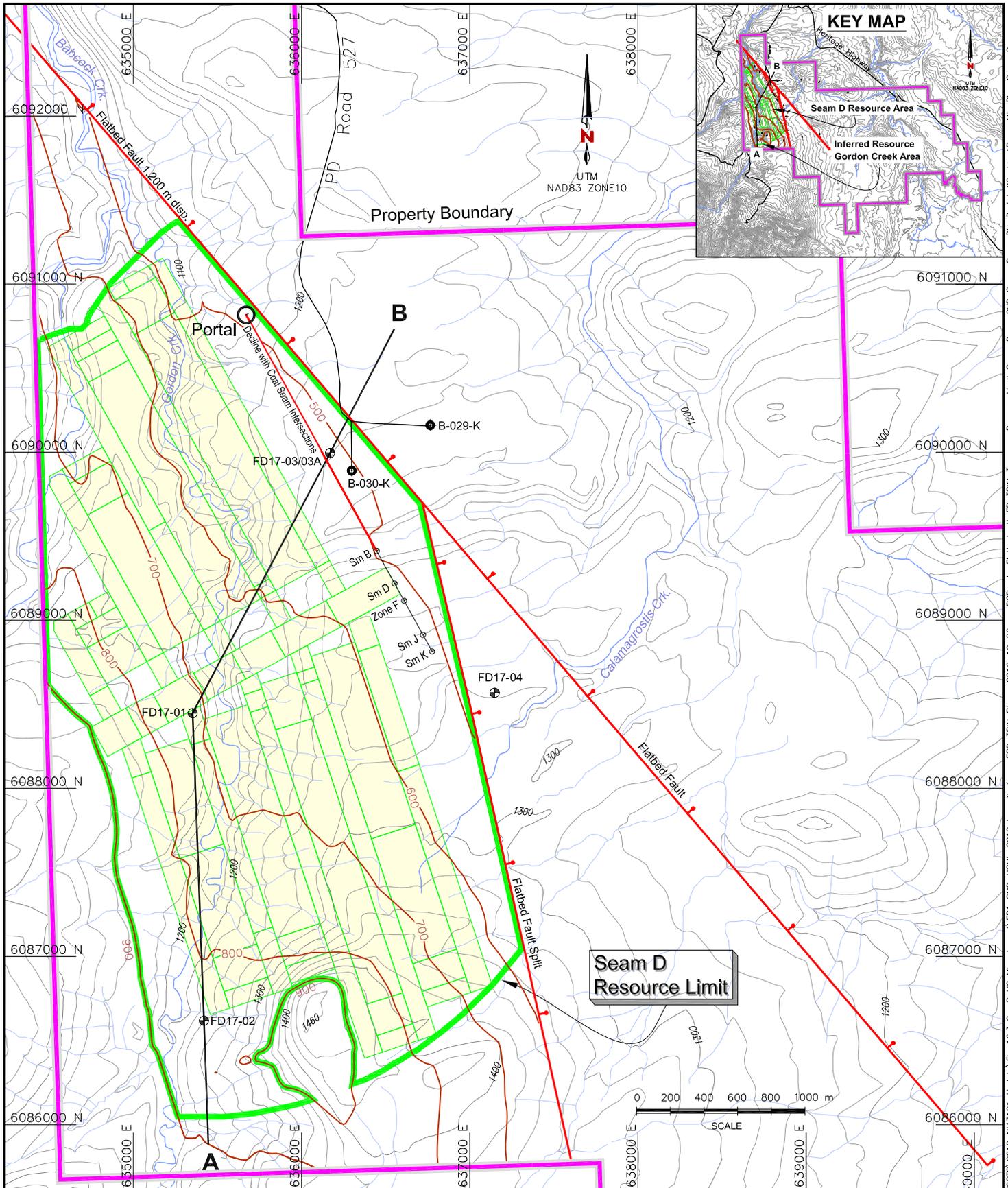
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam B
Projected Underground Mine Layout

DATE: Dec 19, 2018	SCALE: As Shown	
FILE: FBA-SMB-UGML-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

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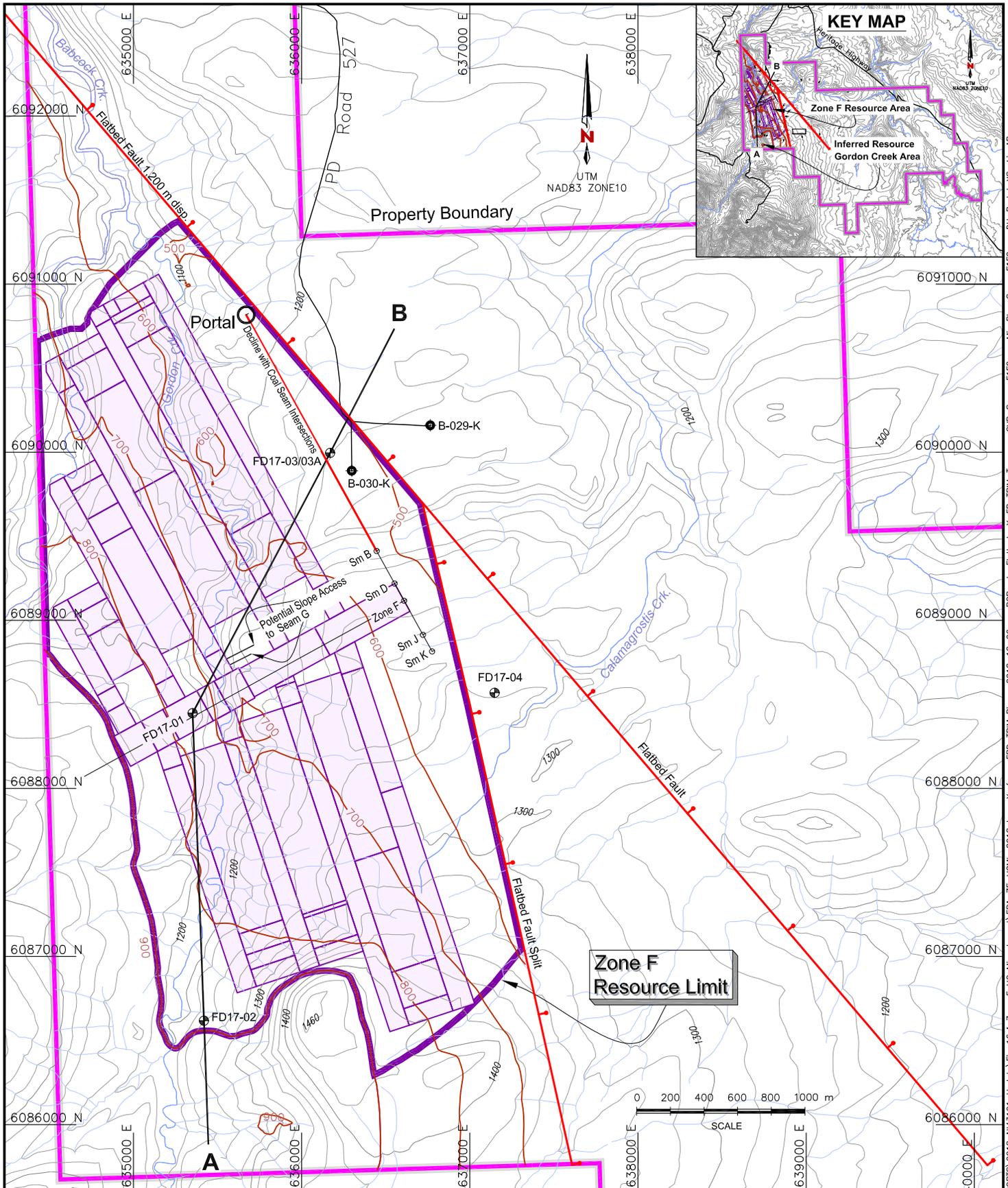
LEGEND:

- | | | | |
|--|-------------------------|--|-----------------------------------|
| | Colonial Coal Drillhole | | Seam D Resource Limit |
| | Old Gas Well | | Overburden Isopachs |
| | River/Creek | | Fault (downthrown side indicated) |
| | Topography | | Projected Underground Mine Layout |
| | Road | | Property Boundary |

FIGURE 16.3

COLONIAL COAL INTERNATIONAL CORP.	
FLATBED COAL PROJECT	
Seam D Projected Underground Mine Layout	
DATE: Dec 19, 2018	SCALE: As Shown
FILE: FBA-SMD-UGML-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
APPROVED BY: JHP / DJL	

12/20/18 - 12:31:27pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 16.3 Sm D UG Mine Layout\FBA-SMD-UGML-2018.dwg Xrefs: X-FBD-TRIM-Rivers-2018-12-06 X-BCRoads-Flatbed X-FB-TRIM-Topo X-ResourceLimit Seam D x-OVB-Seam-D x-DH-Portal-XSecLineAB x-MinePlan Seam D



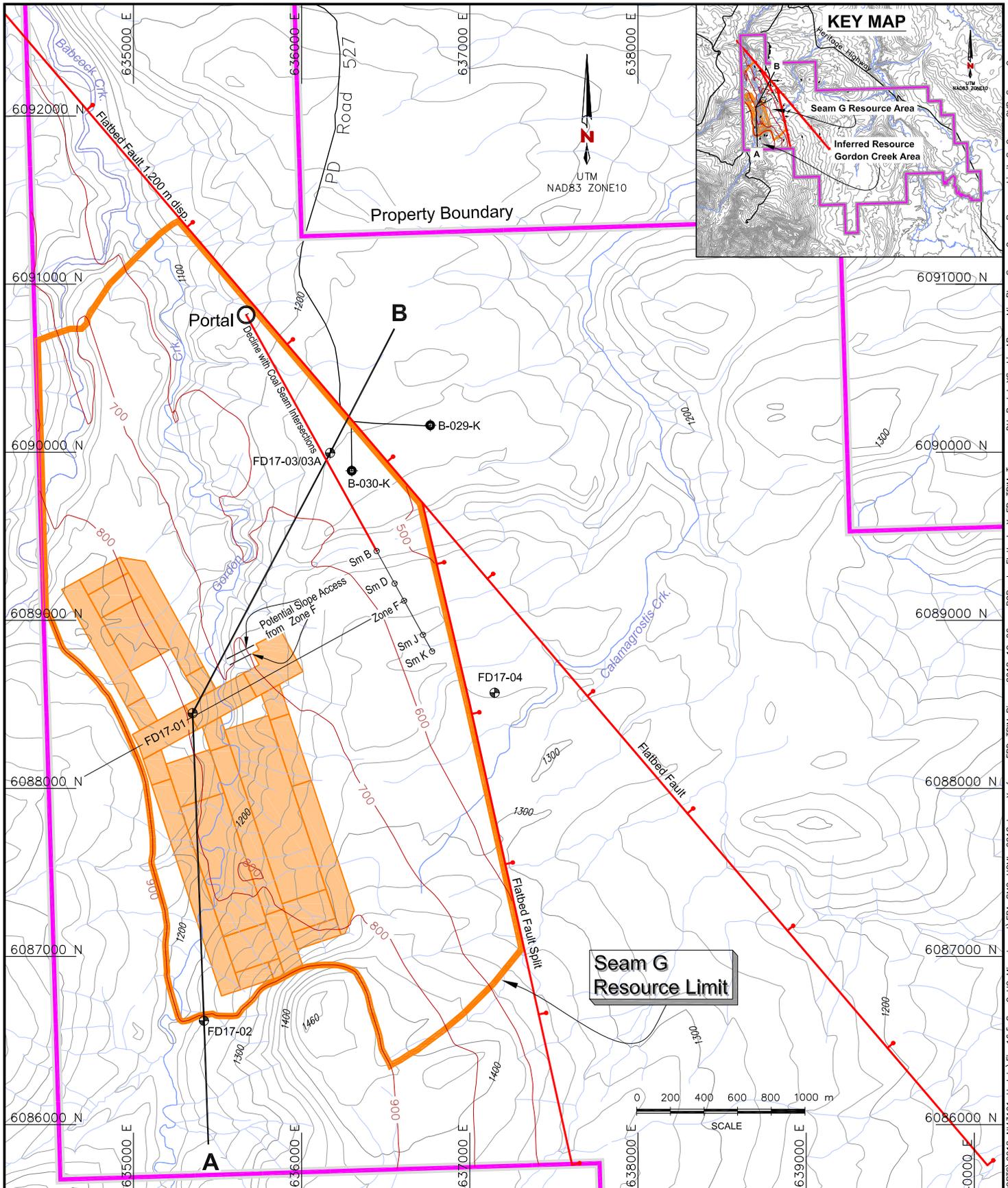
LEGEND:

- | | | | |
|--|-------------------------|--|-----------------------------------|
| | Colonial Coal Drillhole | | Zone F Resource Limit |
| | Old Gas Well | | Overburden Isopachs |
| | River/Creek | | Fault (downthrown side indicated) |
| | Topography | | Projected Underground Mine Layout |
| | Road | | Property Boundary |

FIGURE 16.4

COLONIAL COAL INTERNATIONAL CORP.	
FLATBED COAL PROJECT	
Zone F	
Projected Underground Mine Layout	
DATE: Dec 20, 2018	SCALE: As Shown
FILE: FBA-ZF-UGML-2018	
DRAWN BY: CVS	CHECKED BY: JHP / DJL
APPROVED BY: JHP / DJL	

12/20/18 - 12:36:44pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 16.4 Zone F UG Mine Layout\FBA-ZF-UGML-2018.dwg Xrefs: X-FBD-TRIM-Rivers-2018-12-06 X-BCRoads-Flatbed X-FB-TRIM-Topo X-0V8-Secm-FIF2 X-MinePlan Seam FIF2 X-DH-Portal-XSecLineAB



LEGEND:

	Colonial Coal Drillhole		Seam G Resource Limit
	Old Gas Well		Overburden Isopachs
	River/Creek		Fault (downthrown side indicated)
	Topography		Projected Underground Mine Layout
	Road		Property Boundary

FIGURE 16.5

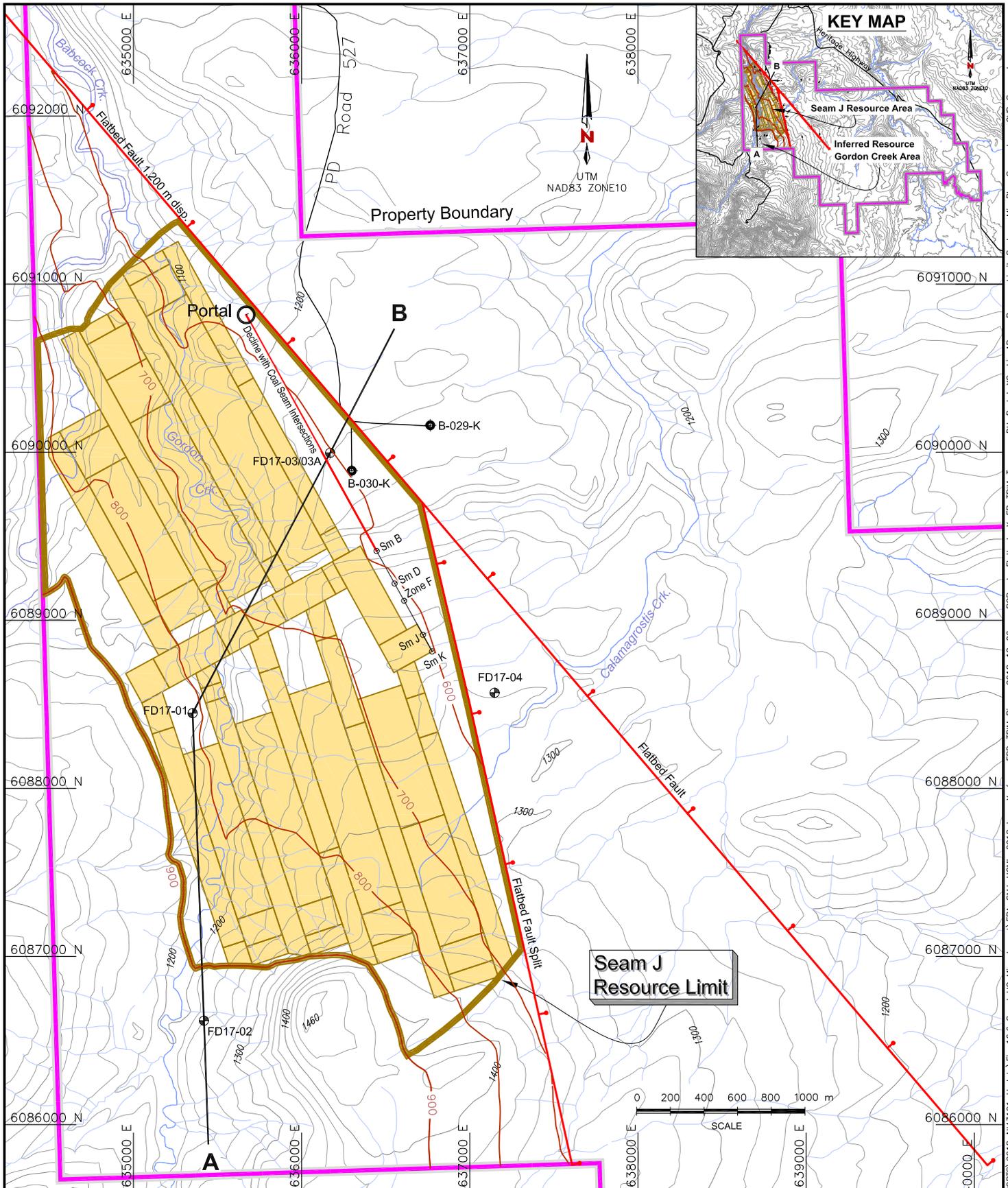
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam G
Projected Underground Mine Layout

DATE: Dec 20, 2018	SCALE: As Shown	
FILE: FBA-SMG-UGML-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

12/20/18 - 12:41:56pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 16.5 Sm G UG Mine Layout\FBA-SMG-UGML-2018.dwg Xrefs: X-FBD-TRIM-Rivers-2018-12-06 X-BCRoads-Flatbed X-FB-TRIM-Topo X-DH-Portal-XSecLineAB X-MinePlan Seam G X-ResourceLimit-SmG X-OWB-Seam-G



LEGEND:

	Colonial Coal Drillhole		Seam J Resource Limit
	Old Gas Well		Overburden Isopachs
	River/Creek		Fault (dowthrown side indicated)
	Topography		Projected Underground Mine Layout
	Road		Property Boundary

FIGURE 16.6

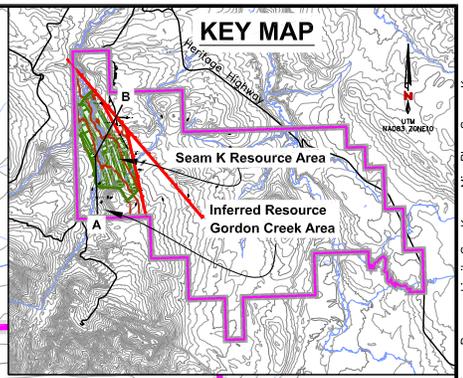
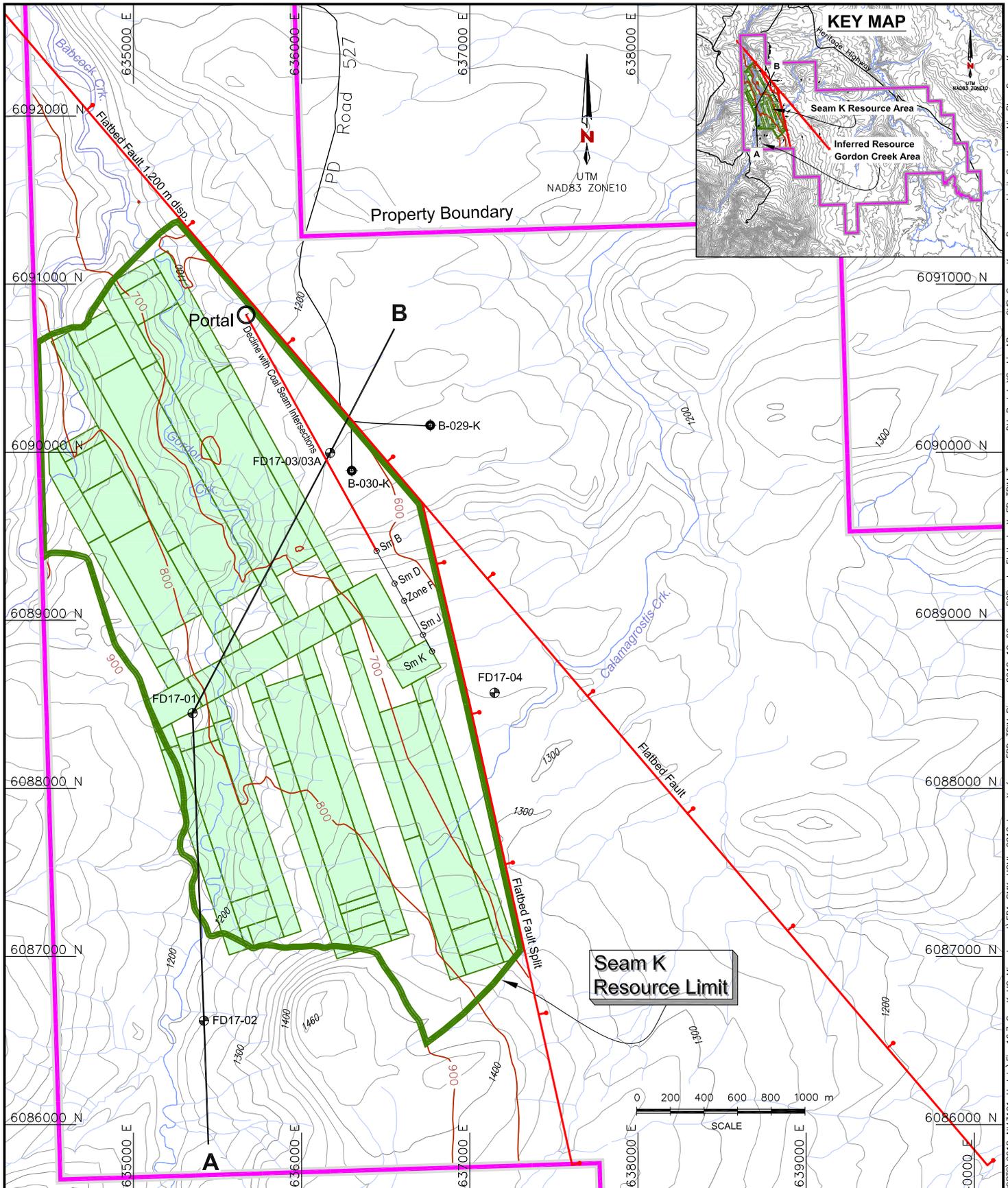
COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

**Seam J
Projected Underground Mine Layout**

DATE: Dec 20, 2018	SCALE: As Shown	
FILE: FBA-SMJ-UGML-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

12/20/18 - 12:46:45pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 16.6 Sm J UG Mine Layout\FBA-SMJ-UGML-2018.dwg Xrefs: x-FBD-IRIM Rivers-2018-12-06 x-BCRoads-Flatbed X-FB-IRIM-Topo x-DH-Portal-XSectLineAB x-ResourceLimit-SMJ x-MinePlan Seam J x-OVB-Seam-J



LEGEND:

	Colonial Coal Drillhole		Seam K Resource Limit
	Old Gas Well		Overburden Isopachs
	River/Creek		Fault (dowthrown side indicated)
	Topography		Projected Underground Mine Layout
	Road		Property Boundary

FIGURE 16.7

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Seam K
Projected Underground Mine Layout

DATE: Dec 12, 2018	SCALE: As Shown	
FILE: FBA-SMK-UGML-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

12/20/18 - 12:53:01 pm K:\FLATBED\REPORTS\2018_N43101_Update\Fig 16.7 Sm K UG Mine Layout\FBA-SMK-UGML-2018.dwg Xrefs: x-FBD-TRIM-Rivers-2018-12-06 x-BCRoads-Flatbed X-FB-TRIM-Topo x-DH-Portal-XSecLineAB x-OVB-Seam-K x-ResourceLimit-Sm K x-MinePlan Seam K

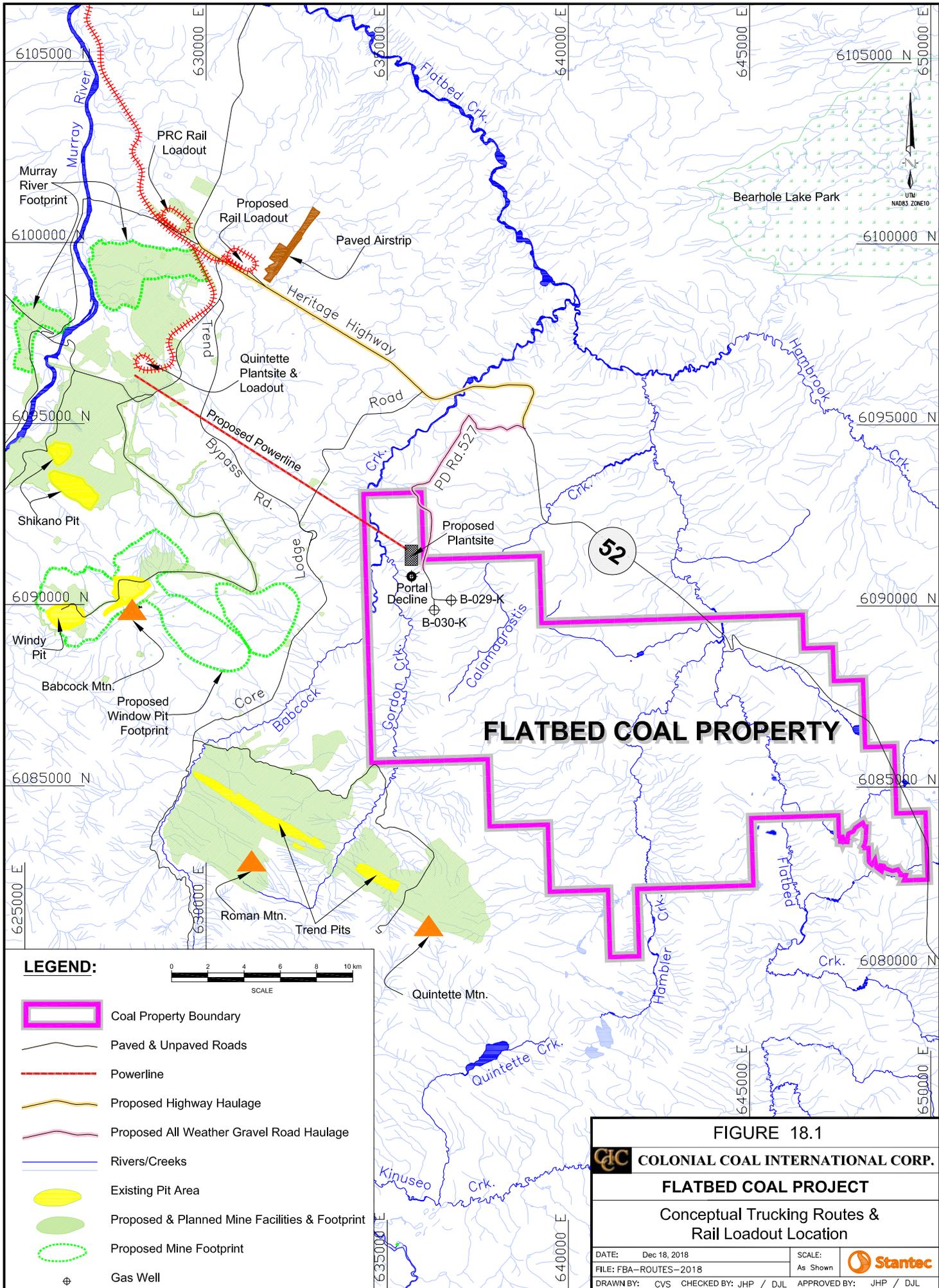


FIGURE 18.1

COLONIAL COAL INTERNATIONAL CORP.

FLATBED COAL PROJECT

Conceptual Trucking Routes & Rail Loadout Location

DATE: Dec 18, 2018	SCALE: As Shown	
FILE: FBA-ROUTES-2018	DRAWN BY: CVS CHECKED BY: JHP / DJL APPROVED BY: JHP / DJL	

12/20/18 - 11:29:23am K:\FLATBED\REPORTS\2018_N43101_Update\Fig 18.1\FBA-ROUTES-2018.dwg Xrefs: x-TRIM-Master_Drainage_2017 x-BCRoads-2018 x-BCRoads-2018

Certification of Qualified Person

29.0 CERTIFICATION OF QUALIFIED PERSON

See the following pages.



TECHNICAL REPORT PRELIMINARY ECONOMIC ASSESSMENT FOR THE GORDON CREEK DEPOSIT -
FLATBED COAL PROPERTY, BRITISH COLUMBIA

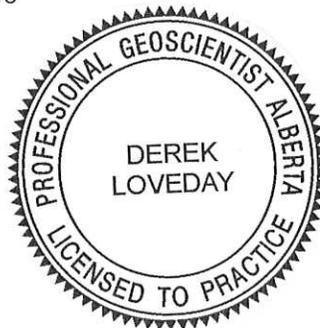
Certification of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

I, Derek J. Loveday, P.Ge., of Salt Lake City, Utah, do hereby certify that:

1. I am currently employed as Project Manager by Stantec Consulting Services Inc., American Plaza II Suite 500, 57 West 200 South Salt Lake City, Utah 84101.
2. I graduated with a Bachelor of Science Honours Degree in Geology from Rhodes University, Grahamstown, South Africa in 1992.
3. I am a licensed Professional Geoscientist in the Province of Alberta, Canada, #159394. I am registered with the South African Council for Natural Scientific Professions (SACNASP) as a Geological Scientist #400022/03.
4. I have worked as a geologist for a total of twenty-three years since my graduation from university, both for mining and exploration companies and as a consultant specializing in resource evaluation for minerals, coal and industrial minerals.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101), and past relevant work experience, I meet the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of all sections of the Technical Report titled: "Technical Report - Preliminary Economic Assessment Gordon Creek Deposit - Flatbed Coal Project, British Columbia" dated December 21, 2018, with effective date of November 12, 2018.
7. I personally inspected the property between October 10 and October 13, 2017.
8. I previously contributed to the preparation of the technical report titled "NI 43-101 Technical Report Flatbed Coal Project Gordon Creek Area" with effective date January 10, 2018.
9. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the parts of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
10. I am independent of the issuer applying all of the tests in Section 1.5 of NI 43-101.
11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Signed and dated this 21th day of December 2018



Derek J. Loveday, P.Ge.
Project Manager, Stantec Consulting Services Inc.

