NI 43-101 Technical Report on
Greenhills Coal Operation
British Columbia, Canada

Prepared for:

Teck Resources Limited.

Prepared by:

Mr. Donald E. Mills P.Geo.
Mr. Andrew J. Knight P.Eng.
Mrs. Alison J. Seward, P.Geo.

Effective date:

31 December, 2019.

Report date:

20 February, 2020.

CERTIFICATE OF QUALIFIED PERSON

I, Donald E. Mills, P.Geo, am employed as a Chief Geologist with Teck Coal Limited ("Teck Coal"), with an office address at Suite 1000, 205, 9 Avenue SE, Calgary, AB T2G 0R3, Canada.

This certificate applies to the technical report titled "NI 43-101 Technical Report on Greenhills Coal Operation, British Columbia, Canada" that has an effective date of 31 December, 2019 (the "technical report").

I am a member of the Engineers and Geoscientists of BC (#33274) and of the Association of Professional Engineers, Geologists, and Geophysicists of Alberta (# M31249).

I graduated with a Bachelor of Science degree in Geology from the University of Alberta, Edmonton, Alberta in 1980.

My relevant experience includes both exploration and production geology at Fording River operations, supporting both short and long range mine planning; project geology including exploration database and geological management of a number of Teck Coal predecessor coal and industrial mineral operations (Fording River, Genesee, Whitewood, Nyco Minerals, Minera Nyco, Greenhills, Cardinal River, Coal Mountain, Line Creek), geological management of the company's non-operating properties (e.g. Brooks, Elco, Mt Duke, Marten Wheeler, Quintette); performed annual corporate reporting duties since 1994 and have acted as a corporate qualified person since 2001. I have worked as a geologist since graduation from university in 1980. I've worked in various geological, project and management capacities for Teck Coal and its predecessor companies for over 39 years. I worked at the Fording River operations (1980–1986) and the remainder out of the Calgary head office as Project Geologist (1986–1995); Senior Geologist, (1995–2007) and Chief Geologist (2007 to date).

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* ("NI 43–101").

I visited the Greenhills Coal Operations most recently on 5 June, 2019.

I am responsible for, or co-responsible for, Sections 1.1, 1.2, 1.5, 1.6, 1.23, 1.25; Sections 2.1 to 2.4, 2.6; Section 6; Section 7; Section 8; Sections 25.1, 25.3, 25.16; Section 26 and Section 27 of the technical report.

I am not independent of Teck Coal Limited as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Greenhills Coal Operations since 1992, including periodically providing geological modeling, database support and semi-annual reserve and resource oversight. I have previously co-authored a technical report on the operations as follows:

- Mills, D., Seward, A.J., and Knight, A.J., 2016: NI 43-101 Technical Report on the Mineral Resource and Mineral Reserve Estimates for the Greenhills Operation, Elkford, British Columbia, Canada: effective date 27 January, 2016.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections 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.

Dated: 20 February 2020

"Signed and sealed"

Donald E. Mills, P.Geo.

Teck

CERTIFICATE OF QUALIFIED PERSON

I, Andrew J. Knight, P.Eng., am employed by Teck Coal Limited ("Teck Coal") as the Superintendent of Engineering with the Greenhills Coal Operation, with an office address of P.O. Box 5000, Elkford, BC Canada, V0B1H0.

This certificate applies to the technical report titled "NI 43-101 Technical Report on Greenhills Coal Operation, British Columbia, Canada" that has an effective date of 31 December, 2019 (the "technical report").

I am a member of the Engineers and Geoscientists of BC (#35613). I graduated with a Bachelor of Applied Science degree in Mining Engineering from Queen's University in Kingston, Ontario in 1997.

My relevant experience includes both short and long range mine planning consisting of pit and dump design, access design, production scheduling, costing and economic analysis of mine plans, geotechnical assessment, equipment selection, drilling and blasting, detailed budgeting, and permitting. I have experience providing support on raw coal operating performance through the process plant with regards to quality, recovery, and throughput, and reconciliation of plant performance. I have worked as a mine engineer since graduation from university in 1997. I've worked in various engineering and operational capacities in Canadian open pit iron ore mining and the western Canadian Rockies metallurgical coal industry. At Teck Coal, I have acted as a qualified person since 2010 and I have worked at the following coal operations and offices: Fording River Operation (2010–2011), Sparwood Office (2012–2013), and Greenhills Operation (2014 to date).

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* ("NI 43–101").

I work on a daily basis at the Greenhills Coal Operation, and this familiarity with the operations serves as my scope of personal inspection.

I am responsible for, or co-responsible for, Sections 1.1, 1.2, 1.3, 1.10, 1.13 to 1.25; Sections 2.1 to 2.6; Section 3; Section 5; Sections 13.4, 13.5; Section 15; Section 16; Section 17; Section 18; Section 19; Section 20; Section 21; Section 22; Section 24; Sections 25.1, 25.5, 25.7 to 25.17; Section 26 and Section 27 of the technical report.

I am not independent of Teck Coal Limited as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Greenhills Coal Operations since 2014. I have previously co-authored a technical report on the operations as follows:

- Mills, D., Seward, A.J., and Knight, A.J., 2016: NI 43-101 Technical Report on the Mineral Resource and Mineral Reserve Estimates for the Greenhills Operation, Elkford, British Columbia, Canada: effective date 27 January, 2016.

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Dated: 20 February 2020

"Signed and sealed"

Andrew J. Knight, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

I, Alison J. Seward, P.Geo, am employed by Teck Coal Limited ("Teck Coal") as the Senior Geologist, Supervisor with the Greenhills Coal Operations, with an office address of P.O. Box 5000, Elkford, BC Canada, V0B1H0.

This certificate applies to the technical report titled "NI 43-101 Technical Report on Greenhills Coal Operation, British Columbia, Canada" that has an effective date of 31 December, 2019 (the "technical report").

I am a member of the Engineers and Geoscientists of British Columbia (#32721). I graduated with a Bachelor of Science degree in Earth and Ocean Science from the University of Victoria, Victoria, British Columbia in 2000.

My relevant experience includes exploration and mine production geology at both Fording River Operation and Greenhills Coal Operation. I have experience supporting Technical Marketing and the wash plant with regards to quality, coal recovery and washability. I also have experience supporting both short and long range mine planning, and mining operations. I am responsible for all project geology including exploration and production, databases, geological models as well as all other aspects of geological management of Teck's Greenhills mine site. I have performed annual and semi-annual site reporting duties such as the mid-year and year end reserve and resource reports, summary of exploration activity, and I have worked as a geologist since graduation from university in 2000. I've worked in various geological, project and management capacities for Teck Coal Limited and its predecessor companies for over 18 years. I have worked at Fording River Operation (2002–2010) as a Modelling Geologist, Production Geologist, Coal Quality Geologist and as an Exploration Geologist. In 2010 I transferred to the Greenhills Coal Operation where I became Senior Geologist, Supervisor (2010 to present).

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* ("NI 43–101").

I work on a daily basis at the Greenhills Coal Operation, and this familiarity with the operations serves as my scope of personal inspection.

I am responsible for, or co-responsible for, Sections 1.1, 1.2, 1.4, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12; Section 2; Section 4; Section 9; Section 10; Section 11; Section 12; Sections 13.1, 13.2, 13.3, 13.6, 13.7; Section 14; Section 23; Section 25.1, 25.2, 25.4, 25.5, 25.6, 25.16; Section 26, and Section 27 of the technical report.

I am not independent of Teck Coal as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Greenhills Coal Operation since 2010. I have previously co-authored a technical report on the operations as follows:

- Mills, D., Seward, A.J., and Knight, A.J., 2016: NI 43-101 Technical Report on the Mineral Resource and Mineral Reserve Estimates for the Greenhills Operation, Elkford, British Columbia, Canada: effective date 27 January, 2016.

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As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections 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.

Dated: 20 February 2020

"signed and sealed"

Alison J. Seward, P.Geo.

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1.0 Summary

1.1 Introduction

Mr. Donald Mills P.Geo., Mr. Andrew Knight P.Eng., and Mrs. Alison Seward, P.Geo., prepared this technical report (the Report) for Teck Resources Limited (Teck) on the Greenhills Coal Operations (the Project), located in British Columbia (BC), Canada.

The coal operations are conducted under a joint venture (JV) agreement between Teck's wholly-owned subsidiary, Teck Coal Partnership and POSCO Canada Limited (POSCAN) and POSCAN's parent, POSCO. The mine operations name is the Greenhills Operations (GHO).

Teck holds an 80% interest in the JV while POSCAN has a 20% interest. Teck Coal Limited (Teck Coal), a wholly-owned subsidiary of Teck Coal Partnership, is Project operator.

Mining commenced in 1983.

1.2 Terms of Reference

The Report provides updated information on the operations, and Coal Resource and Coal Reserve estimates. The information will be used to support disclosures in Teck's Annual Information Form (AIF).

Currency is expressed in Canadian dollars (C$) unless stated otherwise. Units presented are typically metric units, such as metric tonnes, unless otherwise noted. The Report uses Canadian English.

Coal Resource and Coal Reserves estimates are reported using the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (the 2014 CIM Definition Standards). Coal Resources and Coal Reserves are presented on a 100% basis.

1.3 Project Setting

The Greenhills Operation is located in the East Kootenay region of southeastern British Columbia, approximately 330 km by road southwest of Calgary, Alberta and about 8 km northeast of the town of Elkford in the southeast corner of British Columbia.

The operations are accessed via Highway 43 through the town of Elkford. Goods are delivered primarily by transport trucks and occasionally by rail. Coal from GHO is transported in unit trains from the site loadout facilities via rail lines operated by Canadian Pacific Railways (CPR) or Canadian National Railways (CNR). The final rail destination is typically either the Westshore Terminals, 1,150 km to the west in Delta, BC, or Neptune Bulk Terminals in North Vancouver, BC. The CPR and CNR own their own lines and have line sharing agreements in place to expedite traffic in certain areas.

The Project area has long, cold winters and short, cool, dry summers. Operations are conducted year-round.

The operations are situated in the Kootenay Region of the Northern Rocky Mountain physiographic province, within the Elk River valley. Elevations range from about 1,300 masl in the valley floor to about 2,250 masl at the upper extent of the mine. Vegetation varies with elevation. Valley bottoms are dominated by Rocky Mountain Douglas fir, lodgepole pine and trembling aspen. Mountain slopes typically host Engelmann spruce, lodgepole pine, western larch and trembling aspen. Higher elevations are treeless. The major river system in the Project area is the Elk River

1.4 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The total Project area is 12,900 ha. Mineral title is primarily an Estate in Fee Simple (freehold) land holding legally known as Lot 1, District Lot 4588, Plan NEP11279, Kootenay District, which is a Crown Grant consisting of 9,903 ha.

GHO controls the surface and subsurface coal rights to the properties that are in operation and those that are planned for development.

Teck has eight authorized water licences that cover water diversion and usage. The water usage rights held are sufficient to support the life-of mine (LOM) plan.

British Columbia levies mineral taxes. There is a two-tier tax system with a minimum rate of 2% on operating cash flow and a maximum rate of 13% on cash flow after taking available deductions for capital expenditures and other permitted deductions. Teck is not required to pay royalties on freehold land. On February 11, 2019, Teck agreed with POSCAN to substantially increase the royalty paid by POSCAN in respect of its 20% share of production.

Teck Coal and POSCAN bear all costs and expenses incurred in operating Greenhills in proportion to their respective JV interests. POSCAN, pursuant to a property rights grant, has a right to 20% of all coal mined from certain defined lands of the GHO until the end of the operational phase of the joint venture. POSCAN pays Teck a royalty for access to other coal reserves owned by Teck that are processed by GHO equipment and facilities. The JV agreement provided for a review of the terms of the agreement in 2018 and provides for an additional review in 2022. In the event the parties disagree on the continuation of the terms of the agreement, the operational phase will come to an end.

1.5 Geology and Mineralization

Coal deposits are characterized by the Geological Survey of Canada as being of four deposit types, based on differences in seam geometry as a result of sedimentary processes during coal deposition, and subsequent deformation. Under this classification system, the Greenhills seams are classified as “complex”. The Geological Survey of Canada also classifies coal deposits on the basis of the probable

extraction method that would be used to recover coal. The coal measures in the Greenhills area are classified as “surface”.

The GHO are located within the Elk Valley Coalfields. The coal measures are situated within the Upper Jurassic to Lower Cretaceous Kootenay Group sediments:

- Morrissey Formation: sandstones; subdivided into the Weary Ridge and Moose Mountain Members; 20–80 m in thickness;
- Mist Mountain Formation: interbedded sandstone, siltstone, mudstone, shale and thin to thick seams of bituminous to semi-anthracite coal; 450–550 m in thickness;
- Elk Formation: interbedded sandstone, siltstone, mudstone, shale and locally thick beds of chert-pebble conglomerate and thin seams of high volatile bituminous coal; 350–450 m in thickness.

The Mist Mountain Formation contains approximately 25 coal seams of potential economic interest, consisting of medium to high volatile bituminous coal. The Mist Mountain Formation depth of burial ranges from surface exposures to greater than 1,500 m. The coal measures on the GHO property contain bituminous grade coal seams with varying volatile matter contents, such that coal quality varies with depth of burial and location along the strike of the deposit. Seams may range in thickness from 1–16 m.

GHO produces the following coal products:

- Hard coking coal (HCC): coke strength after reaction (CSR) 64+;
- Semi-hard coking coal (SHCC): CSR ≤63.

1.6 History

Companies who undertook exploration, development and operations prior to Teck Coal’s project interest include Kaiser Steel Corp., Kaiser Resources Ltd., B.C. Resources Investment Corporation, Westar Group Limited, and Westar Mining Limited (Westar Mining). Work completed included geological mapping, trenching of coal showings, sampling of both coal outcrops and coal exposed in the trenches, rotary, reverse circulation (RC) and core drilling, excavation and bulk sampling of adits, and Coal Resource and Coal Reserve estimation.

A JV was established between Westar Mining (80%) and POSCAN (20%), with the Greenhills operations commencing in 1983. A mining hiatus occurred in 1992 when Westar Mining filed for creditor protection. In December 1992, Fording Coal Limited, a subsidiary of Canadian Pacific Limited, purchased the Westar Mining Limited interest in the JV. Mining re-commenced in February 1993. In 2001, Fording Coal Limited was re-organized to form Fording Inc.

During 2003, a multi-party agreement was announced that saw Fording Inc. converted into an income trust, the Fording Canadian Coal Trust, and the creation of a coal partnership consisting of a number of metallurgical coal mining properties, which included GHO. As a result of this agreement, a partnership, the

Elk Valley Coal Partnership (EVCP), later renamed to the Teck Coal Partnership, controlled the metallurgical coal operations. EVCP held 80% of the JV, while POSCAN retained a 20% ownership interest. On October 30, 2008, Teck acquired all the assets of the Fording Canadian Coal Trust, thus making Teck the sole owner of EVCP.

Work completed during Teck Coal's project interest has included additional RC and core drilling, in-pit geological mapping, petrographic analysis, metallurgical testwork, Coal Resource and Coal Reserve estimation updates, mining studies, and open pit coal operations.

1.7 Drilling

As at 31 December, 2019, the Project database contained 28,643 drill holes, consisting of 5,503 RC drill holes (714,409 m), 22,924 production holes (549,927 m), and 163 core holes (43,939 m). Drilling for bulk sample collection includes: 18 large diameter reverse flood (LDRF) rotary drill holes (2,459 m) and 35 large diameter core (LDC) drill holes (3,603 m).

A subset of the drill hole project database for Cougar Phases 4 to 10, extracted as of 11 April, 2019, was used to populate coal seam quality data for the 3D block model used in estimating Coal Resources and Coal Reserves. This database subset includes 5,739 drill holes (117,308 m), consisting of 5,328 RC drill holes (107,202 m), 210 production holes (3,011 m), and 152 core holes (4,850 m). Drilling for bulk sample collection includes 31 LDC holes (1,660 m) and 18 LDRF holes (585 m). The database that supports the Coal Resources estimate for Crow Ridge consists of 60 RC drill holes.

Geological logging is done on all core samples collected from the LDC (9-inch core) and HQ (6-inch core) diamond drilling. Information recorded includes lithology identification (coal and rock types) and characteristics; recovery estimates; seam quality sample collection; and structural identification.

All exploration and geotechnical drill holes are geophysically logged, where possible, for gamma-neutron, gamma-density, and caliper. Downhole deviation is only run if the drill hole length is >100 m. Resistivity logs are run if available from the contractor. Logs such as acoustic televiewer and dipmeter are only performed if additional information is needed; typically, these are undertaken as required for geotechnical purposes. Geophysical log data, sample data and driller's seam picks are used to determine seam intercepts. If geophysical logs are not available, the driller's picks are used, but with a lower assigned level of confidence.

Collar surveys are performed using either an onboard drill global positioning system (GPS) instrument or a Real Time Kinetic (RTK) GPS Rover.

Seam true thickness is calculated based on drilled thickness, deviation surveys and dip information. On average, the true seam thickness is less than the drilled seam thickness, depending on the local orientation of the coal seam orientation and the angle of the drill hole.

A total of 55 RC holes (23,019 m) have been completed since the database closeout date for Coal Resource estimation. Of this total 16 drill holes were completed for geotechnical purposes, but were sampled for quality when coal was present. Six sites in Cougar Phases 4, 7, and 8 were subject to LDC drilling (1,232 m) to obtain coking coal samples. The QP considers that this new drilling should have no material effect on the overall tonnage and coal quality estimates, but represent minor upside potential for Coal Resource estimation when incorporated into an updated model.

1.8 Sampling

RC samples are collected on a maximum 0.5 m sample interval. The samples are collected on a 325 mesh screen on a portable shaker table and bagged in plastic or cloth bags depending on dry or wet coal respectively.

Core samples are taken in 1 m increments for each coal seam, and placed into separate bags, which are stored in such a way as to minimize sample disturbance prior to shipment to the laboratory.

Bulk samples can be collected via a test pit, an adit, LDC, or LDRF drilling. Modern bulk sampling uses samples obtained via LDC, or LDRF drilling. Historically, adits or test pits were used. The objective is to obtain an unoxidized, representative sample of the coal seam in a manner that best reflects the method by which the seam will be mined; i.e. if the seam is to be mined by open pit truck/shovel, all rock partings of ≤0.9 m vertical thickness are included in the sample. Thicker partings are excluded. A minimum sample size of 5 t is required for pilot plant washability.

Samples, 1–5 kg in size, are taken of blasthole cuttings of waste rock stratigraphically below the basal seam to delineate areas containing potentially acid-generating (PAG) and non-acid generating (NAG) materials.

Density estimation and assignment to the model blocks from drill holes is completed using a specific gravity formula. This formula estimates the specific gravity (SG) value of coal based on the ash value results received from the laboratory. The average SG value from the 2019 quarterly reconciliation data is 1.41.

Laboratory details include:

- Loring Laboratories Ltd. (Loring): Independent. Located in Calgary, AB. Holds ISO 9001 accreditation for selected analytical techniques. Used from 2009 to December 31, 2019;
- Pearson & Associates Ltd (Pearson): Independent. Located in Victoria, BC. Petrographers accredited by International Committee for Coal and Organic Petrology. Used from 1981 to December 31, 2019;
- Gwil Industries (Gwil): Independent. Located in Calgary, AB. Certified under the Vanguard Solutions Proficiency Testing Program. Used from 1982 to December 31, 2019.
- ALS Global: Independent. Located in Calgary, AB. Certifications not recorded in the Project database. Used from 2011–2017;

- Elk Valley Environmental Services (EVES): Independent. Located in Sparwood, B.C. Participates in bi-annual round robin testing through quality assurance reviews. Used from 1982 to December 31, 2019;
- Bureau Veritas: Independent. Located in Burnaby, BC. Holds ISO 17025 accreditation for selected techniques. Used from February 2013 to December 31, 2019;
- Teck Coal: Not independent; is the operations laboratory. Not accredited. Used from ~1983 to December 31, 2019;
- Hazen Research Inc. (Hazen): Independent. Located in Golden CO, USA. Holds state regulatory agencies certification and Environmental Protection Agency (EPA) credentials. Pilot scale facilities used to process bulk raw coal samples and wash to clean coal specifications. Used from ~2017 to December 21, 2019;
- Canadian Centre for Mineral and Energy Technology (CANMET) Energy Technology Centre: Independent. Located Ottawa, ON. Member of the Canadian Carbonization Research Association (CCRA). Application to obtain ISO 17025:2005 accreditation in progress. Performs carbonization coke tests on bulk size washed samples of coal. Used from 2008 to December 31, 2019.

PAG samples are shipped to Elk Valley Environmental Services in Sparwood for Fizz Test analysis. The QA/QC on PAG samples is undertaken at Bureau Veritas.

Prior to 2014, RC samples were delivered to the Teck Coal laboratory by the drill crew. After 2014, all samples were sent to independent third-party laboratories, who used the same sample preparation procedures, and followed ISO and ASTM procedures.

Sample recovery is a determining factor as to whether the sample is representative of the seam. Samples with >20% recovery are assayed depending on the seam thickness and quality of recovery. A seam with ≤20% sample recovery will only have a raw assay suite completed. The raw assay suite consists of:

- Raw ash, volatile matter (VM), total moisture (TM).

Typically, a full assay suite (proximate analysis) is only carried out on samples with a recovery factor of ≥65%. The full assay suite or consists of:

- Clean ash, fixed carbon (F.C), VM, S, P, FSI, Cl, F, As, Hg, %P.

Proximate analysis, rheological testing, and mineral ash analyses were conducted both at Teck Coal and third-party laboratories.

RC sample collection is audited at least once a week during active RC drilling programs, using a pre-set checklist. A digital record of the audit is retained as part of the quality assurance and quality control (QA/QC) documentation.

A selection of raw composite samples is split (minimum of 5% or one-in-20) by the primary laboratory. The raw check samples are shipped to a secondary (umpire) laboratory to have raw proximate analysis performed. Check samples assayed as part of the QA/QC program are plotted against the regular samples. The minimum qualities compared include ash and VM.

Additional QA/QC checks include:

- The weight of ply samples, as reported from the laboratory, is uploaded into acQuire. The weight of each sample, in combination with the ash of each sample and the drill hole diameter, are used to calculate the theoretical recovery of each interval within acQuire;
- The ash content of intervals is assessed against the geophysical density logs of the RC drill hole. The "Depth Adjustment Tool" is used to view variable adjustment % and guide decisions on compositing. The ash content of raw composites is compared using calculated raw ash content of the composite samples (average of ply samples) versus the laboratory-reported ash of the composite samples, checking for obvious errors.

Drill hole collar data, associated seam intercepts, seam quality and deviation survey data are stored in the acQuire database. Data are loaded directly from logging software, survey companies, or using set importing templates that load the assay data directly from Excel worksheets sent by the laboratories. The database is regularly backed up, using Teck protocols. All original logs and laboratory reports are stored securely on the network.

Special security methods for the shipping and storage of coal samples are not commonly employed, as coal is a relatively low-value bulk commodity. Raw and clean coal samples are kept by the analytical laboratories for a minimum of one year.

1.9 Data Verification

Once per year, as a minimum, Teck Coal geologists visit the primary laboratory and witness aspects of sample handling and sample analysis.

Drill holes are subject to the following location checks: a check of the collar coordinates of each hole against the planned location; and a visual check of down-hole deviations against survey data from surrounding drill holes. Once the locations are verified by the geologist, the coal contacts are picked within the geophysical data, following set protocols. Analytical data from the laboratory are evaluated for anomalies and atypical results, generally using geostatistical software. Any data that appear erroneous are re-analyzed by the laboratory to check for accuracy.

Norwest Corporation (Norwest) undertook a data review in 2011, and examined 24 representative exploration drill hole files, on four random cross-section lines to evaluate the quality of the geological data generated and the extent to which exploration information was interpreted and recorded from downhole sources. Norwest concluded that there were no material issues with the information examined; much of this material has since been mined out.

During 2018, Wood Canada Limited (Wood) completed an independent audit of the GHO Coal Resource and Coal Reserve estimation process, and Teck's system of internal controls over that process for corporate governance purposes. Wood did not find any material issues that could impact the current mine operations, or Coal Resource or Coal Reserve estimation and reporting. Wood identified a number of minor estimation practice issues and process control issues that Teck Coal could consider implementing.

1.10 Metallurgical Testwork

Blending is accomplished at the breaker by combining coal from several stockpiles. Each stockpile contains coal from different seams with similar quality. Site components differ with respect to VM content, ash targets, coal rank and coking properties.

Metallurgical testwork includes coal quality (raw coal analysis and washability), and carbonization testwork. Predicted yields are modeled using the plant delivered ash (which is calculated from breaker delivered ash, breaker reject ash and breaker reject volume), plant reject ash and target clean ash.

Metallurgical testing frequency and type are representative of individual seams on the basis of rank, coking properties and volume, and are done over a range of locations for each seam to ensure that a sufficient sample mass is available for modeling purposes.

Volatile matter, rank, and ash contents are the main items monitored for blending purposes.

Deleterious elements that are regularly monitored include phosphorus, fluorine, sulphur, chlorine, arsenic, and mercury.

GHO performs a reconciliation of the modeled coal volume, ash content delivered to the wash plant and predicted yield based on an ash/yield curve. Reconciliations are performed on a quarterly basis and accumulated on an annual basis.

1.11 Coal Resource Estimation

Coal Resources were estimated for the Swift, Cougar and Crow areas. Modelling is conducted using the commercially-available MineSight software. The database close-out date is 11 April, 2019. Estimation is supported by 5,739 drill holes.

The GHO Coal Resource estimates were primarily based on the results of RC drilling samples, and downhole geophysical gamma and density logs. The 3D model was built using the drill intervals of complete seams from the acQuire database. The seam dips and true thicknesses were calculated based on the drill hole data, and the seam polygons were subsequently generated.

The geological model was constructed using coal depth, thickness and quality data. GHO geologists evaluate gamma, density and caliper geophysical logs. The coal seam tops and bottoms are measured

primarily from the gamma density log and secondarily from the gamma neutron logs. The resource estimate was based on a minimum true thickness of 1.0 m for a coal composite. Gamma density log coal seam thicknesses generally closely represent the mineable coal seam thickness in the mine at the location of the drill hole.

Model items included topography, waste, and coal parameter data. Where quality information was not amenable to interpolation from drill composites, data were statistically infilled based on geographic location. Computer model block-specific SG values were used for the conversion of volumes of in-place coal to tonnes.

The true thicknesses of the seams were calculated using the dip of the coal seams and the length of the coal composite. True thickness was interpolated into the 3D block model using an inverse distance weighting to the second power (ID2) approach. Other interpolation parameters included a circular search method, and a search distance of 2,500 m. Coal quality data were interpolated into the 3D block model using an inverse distance weighing method. The search distance for each quality criterion was between 500–800 m, and the estimation method power was between 1.5–1.7.

Blocks within the 3D block model were validated by an internal audit report that was generated after every model build. The audit examined the same block from every model build to verify consistency between models, verified that block calculations were successfully run, and compared model-generated values to manually-calculated values.

A minimum of three drill hole intercepts through an individual coal seam must fall within the associated ellipsoid to confidence-classify a block. The block was assigned the highest level of assurance that was supported by the data.

To assess reasonable prospects of eventual economic extraction, a depth limit was based on a pit shell with an incremental strip ratio limit of 15:1 m^3/t of raw coal. Input costs to the pit shell, and therefore the break-even stripping ratio cut-off calculation are provided in Table 1-1. Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles).

1.12 Coal Resource Statement

Coal Resources are reported using the 2014 CIM Definition Standards. The QP for the estimate is Mrs. Alison Seward, P.Geo., a Teck Coal employee. Coal Resources are tabulated in Table 1-2. Coal Resources are reported exclusive of those Coal Resources that were converted to Coal Reserves. Coal Resources that are not Coal Reserves do not have demonstrated economic viability.

Table 1-1: Inputs to Break-Even Stripping Ratio Cut-off

Item	Unit	Values
Selling price	US$/t	140
Waste mining costs	$/bcm	4
Coal mining costs	$/bcm	6.40
Processing cost	$/t	9.90
General and administrative costs	$/t	12
Other (includes operating leases, royalties, distribution, sustaining capital, reclamation)	$/t	50.50
Recommended break-even stripping ratio	bcmw/mtrc	15.0

Notes: bcm = bank cubic metre; bcmw = bank cubic metre waste; mtrc = tonne raw coal.

Table 1-2: Coal Resource Statement

Pit/Area	Coal Type	Measured (raw coal; t x 1,000)	Indicated (raw coal; t x 1,000)	Total Measured and Indicated (raw coal; t x 1,000)	Inferred (raw coal; t x 1,000)
Cougar	Metallurgical	165,004	202,380	367,384	132,211
Crow Ridge	Metallurgical	14,446	25,171	39,617	36,329
Totals	***Metallurgical***	***179,450***	***227,551***	***407,001***	***168,540***

Notes to Accompany Coal Resource Table:

1. The Qualified Person for the resource estimate is Mrs. Alison Seward, P.Geo., a Teck employee.
2. Coal Resources have been classified using the 2014 CIM Definition Standards. Coal Resources are reported exclusive of those Coal Resources that have been modified to Coal Reserves. Coal Resources that are not Coal Reserves do not have demonstrated economic viability. The Coal Resources have an effective date of 31 December, 2019.
3. The Coal Resources are reported using the following assumptions: average selling price of US$140/t, waste mining cost of $4/bcm, coal mining cost of $6.40/bcm; processing cost of $9.90/t, general and administrative cost of $12/t, other costs of $50.50/t, and break-even strip ratio of 15 bcmw/mtrc. Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles).
4. All estimates have been rounded. Totals may not sum due to rounding.

Areas of uncertainty that may materially impact the Coal Resource estimates include:

- Changes to long-term coal price assumptions;
- Changes in geological interpretations including the size, shape and distribution of interpreted lithologies;
- Changes in local interpretations of seam geometry, fault geometry and seam continuity;
- Changes to coal recovery assumptions;

- Changes to the input assumptions used to derive the conceptual open pit outlines used to constrain the estimate;
- Variations in geotechnical, hydrogeological and mining assumptions;
- Changes to environmental, permitting and social license assumptions.

1.13 Coal Reserve Estimation

Coal Reserves are reported for the Cougar Phases 4, 7, 8, 9, and Swift (GHO) areas. Coal Reserves are based on pit designs and a long-range mine development plan prepared by GHO. Ultimate pit shells were created using long-term product coal pricing and US dollar to Canadian dollar exchange rate estimates. Waste haulage, waste storage and geotechnical issues were considered in the final pit design. If the ultimate pit shell contains Inferred Coal Resources, that coal is set to waste, and is not included in the Coal Reserves.

Coal Resources are converted to Coal Reserves using the following inputs:

- Topographic considerations;
- Mining factors such as loss and dilution as well as additional losses due to mining in highly-faulted zones. These factors are mostly derived from operating experience at GHO;
- SG values for coal, based on empirical formulas, validated over the history of mining at GHO;
- Detailed waste and coal haulage costs;
- Detailed yield assumptions;
- Geotechnical suitability of pits and dumps;
- Detailed site costs;
- Reasonable permitability prospects;
- LOM plan.

1.14 Coal Reserve Statement

Coal Reserves are an estimate of the saleable coal product. The reference point is the exit point of the coal product from the processing plant. Coal Reserves are reported using the 2014 CIM Definition Standards. The QP for the estimate is Mr. Andrew Knight, P.Eng., a Teck employee. Coal Reserves are provided in Table 1-3 and have an effective date of 31 December, 2019.

Table 1-3: Coal Reserves Statement

Pit/Area	Coal Type	Proven (clean coal; t x 1,000)	Probable (clean coal; t x 1,000)	Total Reserve (clean coal; t x 1,000)	Strip Ratio
Cougar Phase 4	Metallurgical	9,896	7,287	17,186	2.9
Cougar Phase 7	Metallurgical	1,738	27,602	29,340	12.2
Cougar Phase 8	Metallurgical		32,665	32,665	13.1
Cougar Phase 9	Metallurgical		101,764	101,764	12.7
Swift	Metallurgical		114,076	114,076	11.1
Total	***Metallurgical***	***11,634***	***283,394***	***295,028***	***12.2***

Notes to Accompany Coal Reserves Table:

1. The Qualified Person for the reserve estimate is Mr. Andrew Knight, P.Eng., a Teck employee.
2. Coal Reserves have been classified using the 2014 CIM Definition Standards. The Coal Reserves have an effective date of 31 December, 2019.
3. The Coal Reserves are supported reported using the following assumptions: average selling price of US$140/t, waste mining cost of $3–$7/bcm depending on haul distance, coal mining cost of $5–$8/bcm depending on haulage distance; processing cost of $9.90/t, general and administrative cost of $12/t, other costs of $50.50/t, break-even strip ratio of 15, minimum mineable seam thickness of 1.00 m; minimum removable parting thickness of 0.70 m; dilution thickness of 0.1 m; coal loss thickness of 0.2 m; rock dilution ash of 80%; rock dilution specific gravity of 2.30; and parting dilution ash of 80%. Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles). More complex criteria are used for footwall slopes that are structure specific. Yield is a function of feed ash and product and is therefore seam and product dependent.
4. All estimates have been rounded. Totals may not sum due to rounding.

Areas of uncertainty that may materially impact the Coal Reserve estimates include:

- Changes to long-term coal price assumptions;
- Changes in geological interpretations including the size, shape and distribution of interpreted seams and waste;
- Changes in local interpretations of seam geometry, fault geometry and seam continuity;
- Changes to the input assumptions used to derive the open pit outlines used to constrain the estimate;
- Variations in geotechnical, hydrogeological and mining assumptions;
- Changes to environmental, permitting and social license assumptions.

1.15 Mine Plan

The mining operations use conventional truck-and-shovel methods. As a result of delivery requirements and varying coal seam qualities it is necessary to have multiple coal seams exposed at any time. GHO

currently produces coal from two active pit phases (Cougar Phases 4 and 7) using open-pit coal mining methods, with primary waste stripping and coal mining completed by shovels and rear dump haul trucks. An additional three phases (Cougar Phases 8, and 9, and Swift (GHO)) are planned.

Geotechnical assumptions use pit slope angles that range from 40–51º overall highwall angles. Footwall slope designs use more complex criteria that are structure-dependent

Teck actively manages water within the pits throughout the year by dewatering with the use of surface and deep-well pumps via pipelines to water management infrastructure. Teck has invested in a sustainable water supply strategy and constructed a network of water conveyance pipelines from the pits that will supply water to all the industrial processes on site while reducing clean ground water consumption and the quantity of mine contact water discharged off site. The operations first priority is to look for opportunities to recycle water within the operations with excess water discharging to the receiving environment. A portion of the pumped water is re-used for purposes such as vehicle washing, fire suppression, dust suppression and coal washing in the wash plant.

To support the LOM plan, a series of pit shells are produced, and an optimal pit shell is determined for the ultimate pit design. Areas where the pit design differs from the initial shell can be due to geotechnical constraints or where mining outside the pit shell limits is required to provide access to the pits. Any additional waste is included in the overall strip ratio and economics. The review of the design indicates that the phased pit designs align well to the optimum shell generated and neither the updates to the geology or economics significantly alter the design.

Spoils can be placed either in a mined-out pit phase, or placed on original ground.

Drilling and blasting operations, and production monitoring are conventional to coal operations, as are the equipment types and usage.

1.16 Recovery Plan

The process plant uses conventional equipment and a conventional process. The flowsheet design was based on testwork results, study designs and industry-standard practices.

The basic operation of a coal processing plant is gravity separation and flotation. Based on the difference in specific gravity of coal and rock, the coarser coal can be separated to a desired specification. To assist gravity separation, mechanical means are also used. At GHO, this is accomplished through vibrating screens, cyclones and spirals. Flotation is used to recover very fine coal. Each technique contributes to the recovery of clean coal from the raw coal feed.

The plant power consumption averages 80,000,000 kWh/year. The average water usage by the plant is 1.65 Mm^3, which is drawn from a combination of mine contact water and well water. The split of well water versus mine contact water usage varies by year. The main reagents used in the plant include kerosene, MIBC, and flocculant.

1.17 Infrastructure

Surface infrastructure to support operations is in place, and includes:

- Open pit areas;
- Processing facilities: coal preparation plant including wash and drying facilities, together with management and engineering offices, change house, maintenance shops, warehouse, assay laboratory facilities;
- Mine facilities: management and engineering offices, change house, heavy and light vehicle workshops, wash bay, warehouse, explosives magazine, crusher, mine access gate house, return water pump house;
- Administration buildings: facilities for overall site management, safety inductions, and general and administrative functions;
- Raw coal stockpiles;
- Breaker;
- Waste dumps;
- Haul roads;
- Raw coal and clean coal conveyor system
- Rail load-out facilities;
- Water management facilities: stormwater and sediment ponds, water storage tanks, water diversions, culverts;
- Tailings storage and coarse coal refuse storage facilities;
- Landfill facility;
- Sewage treatment facility;
- Electrical power system;
- Fuel storage facilities;
- Explosive raw product storage and explosive bulk truck maintenance facility.

Raw coal is stockpiled in several areas of the mine. The stockpiles are placed according to available space, with preferred locations near the breaker or active pits. Historically, waste rock has been deposited in spoil piles in three main areas at the GHO site, located to the east, west and north of the Cougar Pits. Waste rock has also been backfilled in previously-mined areas.

As a result of coal processing at the plant, including washing, two waste types are generated, coarse coal refuse (CCR) and tailings. CCR is hauled to one of two CCR storage areas; these areas will reach permitted capacity in approximately 2022. An additional dry stack storage facility is planned at Site F, situated immediately north of the tailings storage facility (TSF), and adjacent to an existing CCR storage area. Geotechnical investigations and conceptual designs have been prepared for Site F.

The TSF consists of a tailing pond which is retained by two dams. Tailings are pumped as slurry via a pipeline to the TSF. The tailings dams undergo raises during mining operations as required. With the current tailings system, the existing storage facility will be insufficient for the duration of the LOM plan. Teck

is in the process of updating a tailings strategy that considers alternative tailings management options that could render the existing facility sufficient for the LOM needs.

Water management at GHO is an essential component of operational planning which ensures availability of water, ample capacity and structural integrity within the water management infrastructure in order to handle anticipated flows and volumes. Water management structures include dam structures, catch basins, sediment and settling ponds, conveyance ditches, and the TSF. The catch basins, ponds, and ditches are used to control the effects of sediment-laden water prior to discharge catchments that feed the Elk River. Dewatering of the active pits is required to maintain safe and productive mining, and pit dewatering will be required throughout the remainder of pit life.

Water usage is licenced through under the *Water Sustainability Act*, and no changes can occur without considering the existing authorizations. Teck currently holds eight authorized water licences for water use (consumptive) or water diversion (non-consumptive). Water supply for the mine is provided by four main deep groundwater wells located in the Fording River Valley. In addition, there are two backup wells located in the Greenhills Creek watershed area. All of these wells are situated within the Project area. The process plant recycles approximately 53% of the water used in the coal cleaning process. Make-up water is obtained from the wells.

Mining personnel are recruited from across Canada with most living in the Elk Valley, within the towns of Elkford, Sparwood or Fernie. There is no on-site accommodation, and personnel drive-in-drive-out to the operations.

Power to the site is supplied by BC Hydro via the BC & Alberta link, known as the Kan-Elk line. There is a single 138 kV power line into the GHO property, which is a spur line of a main hydroelectric line.

1.18 Markets and Contracts

No market studies are relevant as the operations have sales contracts in place. Such contracts are typically one-year terms, and renegotiated annually. Markets for the metallurgical coal products include Asia, Europe, North and South American customers. GHO produces metallurgical coal for the global steel industry.

Quarterly priced sales represent approximately 40% of sales, with the sales balance priced at levels reflecting market conditions when sales are concluded.

Major site contracts include fuel supply, explosives and accessories, and exploration drilling and maintenance support as needed. Contracts are in place with both CPR and CNR for coal transport to the Westshore Terminals, Neptune Bulk Terminals and Ridley Terminal . Contracts are also in place with both terminal facilities to offload, stockpile, blend GHO coal to Teck's product specifications and, load bulk cargo vessels. Teck holds a 46% interest in Neptune Bulk Terminals. Contracts are negotiated and renewed as needed. Contract terms are within industry norms, and typical of similar contracts in BC that Teck is familiar with.

1.19 Environmental, Permitting and Social Considerations

Baseline studies were completed in support of initial operations. Mining operations commenced in 1983. Additional permitting activities are undertaken as required.

1.19.1 ENVIRONMENTAL CONSIDERATIONS

The Greenhills Operations Environmental Management System (EMS) is certified under the ISO 14001 standard and is consistent with other Teck operations in which the pursuit of sustainability guides the approach to business. Teck is committed to environmental management best practices and to achieve continual improvement in the company's environmental performance. Through this policy Teck committed to:

- Elk Valley Water Quality Plan;
- Biodiversity Management Plan;
- Fugitive Dust Control Management Plan;
- Cast Over Management Plan;
- Mine Water Management Plan;
- Pit Dewatering Management Plan;
- Erosion and Sediment Control Management Plan;
- Invasive Plant Management Plan;
- Migratory Bird Management Plan;
- Grizzly Bear Denning Management Plan;
- Soil Salvage Management Plan;
- Metal Leaching and Acid Rock Drainage Management Plan;
- Flocculent Management Plan;
- Nitrogen Management Plan;
- Site Specific Groundwater Monitoring Plan;
- Seep Monitoring Plan;
- Tributary Management Plan.

In February 2018, the Government of Canada proposed new regulations under the *Fisheries Act* relating to coal mining effluent. While these regulations are still in development, they could impose significant costs and operating limitations on our steelmaking coal operations. Teck cannot operate the Elk Valley coal mines, including GHO, in compliance with the *Fisheries Act* and its current associated regulations.

During the third quarter of 2018, Teck Coal received notice from Canadian federal prosecutors of potential charges under the *Fisheries Act* in connection with discharges of selenium and calcite from steelmaking coal mines in the Elk Valley. Since 2014, compliance limits and site performance objectives for selenium and other constituents, as well as requirements to address calcite, in surface water throughout the Elk Valley and in the Koocanusa Reservoir have been established under a regional permit issued by the Provincial government, which references the Elk Valley Water Quality Plan. Federal regulatory issues may create additional difficulties in obtaining permits for the Elk Valley operations, whether or not charges are

eventually laid, or Teck is successful in defending any charges. Teck expects that discussions with respect to the draft charges will continue through the first quarter of 2020.

Fish census data obtained in late 2019 showed unexpected and substantial reductions in populations of Westslope Cutthroat trout in certain mine-affected waters in the Elk Valley. The causes of the reductions are unclear and substantial technical effort is underway to determine whether the reductions are associated with water quality issues, flow conditions and habitat availability, or predation or other natural causes, and to develop a response plan. Until the results of this additional work are available, and appropriate mitigation measures in place, Teck Coal may face delays in permitting or restrictions on mining activities in the Elk Valley, including for the GHO.

1.19.2 CLOSURE AND RECLAMATION PLANNING

The approach to reclamation design and implementation is directed by GHO's overarching end land use and biodiversity objectives:

- Long term safety and stability of drainages, landforms, and features;
- Water quality that meets acceptable quality guidelines for safe release to the surrounding environment and use by local flora and fauna;
- A net positive impact on biodiversity by maintaining or re-establishing self-sustaining landscapes and ecosystems that leads to agreed, viable, long term and diverse land use objectives in Teck's operating areas.

The reclamation plan is based on the current approved permits and is considered a high-level conceptual plan that will change throughout the active mining period. Provisional closure costs are considered in the economic analysis that supports the Coal Reserves. Due to the length of the mine life, final closure costs will not be estimated until about five years prior to planned operations cessation.

1.19.3 PERMITTING CONSIDERATIONS

As of December 31, 2019, all necessary licences and permits and their subsequent amendments are in place for current operations at GHO.

Permits will be required for the following areas that are included in the LOM plan:

- Site F Rejects Spoil; 2021. For construction start in 2022;
- Cougar Phase 8 by 2022;
- Phase 5 by 2022;
- West Spoil Phase 3 by 2022;
- Cataract Spoil by 2022;
- Cougar Phase 9 by 2025;
- Swift Coal Reserves transfer by 2023.

1.19.4 SOCIAL CONSIDERATIONS

In 2016, the Ktunaxa Nation Council and Teck signed an Impact Management and Benefits Agreement that creates numerous long-term benefits for the Ktunaxa people and increased certainty around future sustainable mining development in the Elk Valley region. The Impact Management and Benefits Agreement includes the area of the Greenhills operations, and sets out commitments for both parties in the areas of consultation and engagement, environment and land stewardship, employment and business opportunities for Ktunaxa citizens, and cultural resources management.

Teck also works with a number of local partners and organizations on economic, social and environmental initiatives.

1.20 Capital Cost Estimates

Capital and operating costs forecasts are prepared to meet a ±25% accuracy range.

Capital expenditures for development of new mining areas and equipment acquisitions and replacements are developed and a schedule of the spending is prepared. Costs are based on vendor quotes, and forecasts based on past operating experience, depending on the level of detail required for the cost estimate, and the timing of the capital expenditure.

The LOM capital cost estimate is summarized in Table 1-4. In this table:

- Mining equipment includes the capital costs required to purchase haul trucks, shovels, drills, loaders and support equipment;
- Plant and infrastructure include expenditures required to sustain plant operations and maintain the integrity of site utilities;
- Pit development includes permitting, access, pre-development work, and infrastructure costs;
- Sustainability includes the capital costs required for water treatment, reclamation, and infrastructure required to minimize environmental impact.

Table 1-4: LOM Capital Cost Estimate

Capital Expenditures	(000's C$)
Mining equipment	$1,922,582
Plant & infrastructure	$221,735
Infrastructure	$306,084
Pit development	$370,798
Sustainability	$610,372
Total capital	***$3,431,571***

1.21 Operating Cost Estimates

Anticipated LOM operating costs are included in Table 1-5.

Operating costs include:

- Mining and processing costs include all labour, fuel, electrical power, consumables, repair parts and external services;
- Transportation costs include logistical costs related to the transport of clean coal products from site to customers;
- "Other" includes capital lease payments, exploration and head office allocations.

The operating costs include allocations for costs incurred when a portion of the coal is sent to the Fording River plant for treatment. This is not a consistent practice, but occurs on an as-required, as-needs basis. The Fording River Operations bill process costs incurred from processing this coal back to GHO on a dollar per tonne basis.

1.22 Economic Analysis

Teck is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 for technical reports on properties currently in production and where no material production expansion is planned.

Coal Reserve declaration is supported by a positive cash flow.

1.23 Risks

The major risks facing the operations are water management and quality, and obtaining the required permits to allow the execution of the LOM plan as envisaged.

Table 1-5: LOM Operating Cost Estimate

Operating Costs	(C$/t clean coal)
Mining and processing	87.78
Transportation	34.43
Other	6.11
Total cash costs	***128.32***

1.24 Interpretation and Conclusions

Under the assumptions in this Report, the GHO show a positive cash flow over the life-of-mine and support Coal Reserves. The mine plan is achievable under the set of assumptions and parameters used.

1.25 Recommendations

As GHO is an operating mine, with no planned production rate expansions, the QPs have no meaningful recommendations to make.

2.0 Introduction

2.1 Introduction

Mr. Donald Mills P.Geo., Mr. Andrew Knight P.Eng., and Mrs. Alison Seward, P.Geo., prepared this technical report (the Report) for Teck Resources Limited (Teck) on the Greenhills Coal Operations (the Project), located in British Columbia (BC), Canada (Figure 2-1).

The coal operations are conducted under a joint venture (JV) agreement between Teck's wholly-owned subsidiary, Teck Coal Partnership and POSCO Canada Limited (POSCAN) and POSCAN's parent, POSCO. The mine operations name is the Greenhills Operations (GHO).

Teck holds an 80% interest in the JV while POSCAN has a 20% interest. Teck Coal Limited (Teck Coal), a wholly-owned subsidiary of Teck Coal Partnership, is Project operator.

Mining commenced in 1983.

2.2 Terms of Reference

The Report provides updated information on the operations, and Coal Resource and Coal Reserve estimates. The information will be used to support disclosures in Teck's Annual Information Form (AIF).

Currency is expressed in Canadian dollars (C$) unless stated otherwise. Units presented are typically metric units, unless otherwise noted. The Report uses Canadian English.

Coal Resource and Coal Reserves estimates are reported using the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (the 2014 CIM Definition Standards). Coal Resources and Coal Reserves are presented on a 100% basis.

The Coal Resource and Coal Reserve estimates make reference to metallurgical coal. Metallurgical coal is a grade of coal that can be used to produce good-quality coke. Coke is an essential fuel and reactant in the blast furnace process for primary steelmaking. Metallurgical coal is low in ash, moisture, sulphur and phosphorus content.

2.3 Qualified Persons

The following Teck employees serve as the qualified persons for this Technical Report as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

- Donald E. Mills, P.Geo, Chief Geologist;
- Andrew J. Knight, P.Eng, Superintendent Engineering;
- Alison J. Seward, P.Geo, Senior Geologist, Supervisor.

Figure 2-1: Project Location Plan

Note: Figure prepared by Teck, 2016. Greenhills Operations (GHO) shown highlighted in red. FRO = Fording River Operations; LCO = Line Creek Operations; EVO = Elk Valley Operations; CMO = Coal Mountain Operations. These operations are held by Teck, but are not part of this technical report. CPR = Canadian Pacific Railway. Stippled line is the BC/Alberta provincial boundary. Yellow squares indicate township locations.

2.4 Site Visits and Scope of Personal Inspection

Both Mr. Knight and Mrs. Seward are employed by Teck Coal at GHO and make daily to weekly site inspections.

Mr. Mills is employed by Teck Coal at the Teck Calgary office and makes regular site visits to GHO. Mr. Mills made two visits to GHO in 2019. The first, on 9 May, 2019, was part of the annual reserves and resources site tour and was accompanied by Teck Resources staff and Teck Coal mine superintendents. The visit consisted of a meeting with mine geology engineering and geology staff and a site inspection of the mine operations. The discussions covered in the review included but were not limited to: GHO modeling overview including changes in modeling parameters; 2018 in-pit and ex-pit exploration results; 2019 exploration progress to date; five-year drilling plans; 2019 mine plan including spoil design changes and Q1 2019 coal reconciliation vs budget; transition from 2018 to 2019 life of mine plan and a review of the

GHO 2018 external audit and subsequent action items. The second visit was 5 June, 2019 which consisted of a tour of the GHO wash plant.

Mr. Knight has been the Engineering Superintendent at GHO since January 2014 and routinely reviews five-year drilling plans, life-of-mine (LOM) and short-range tactical plans, mine designs (including pioneering activities and road access construction), Coal Resource and Coal Reserve reporting, modelling, and reconciliation results. Mr. Knight also directly participates in annual business planning, production forecasting, waste dump planning and operational cost reviews.

Mrs. Seward has been the Senior Geologist, Supervisor at GHO since 2010, and routinely creates the five-year drilling plans, is a QP for the Coal Resource and Coal Reserve reporting, and regularly reviews the modelling and reconciliation results. Mrs Seward also directly participates in the active exploration drill programs, monthly coal quality meetings and monitors quality of products as they are being produced.

2.5 Effective Dates

The Report has a number of effective dates including:

- Date of closure of database used for resource estimation: 11 April, 2019;
- Date of last drilling included in the database used for resource estimation: 27 January 2019;
- Date of last drilling information included in the report: 31 December, 2019;
- Date of last available information on mineral tenure and tenure payments: 11 February, 2020;
- Date of Coal Resource estimate: 31 December, 2019;
- Date of Coal Reserve estimate: 31 December, 2019.

The overall effective date of the Report is 31 December, 2019.

2.6 Information Sources and References

The reports and documents listed Section 2.7 and Section 27.0 of this Report were also used to support the preparation of the Report.

Additional information was sought from Teck personnel where required.

2.7 Previous Technical Reports

Teck has previously filed a technical report on the Project:

- Mills, D., Seward, A.J., and Knight, A.J., 2016: NI 43-101 Technical Report on the Mineral Resource and Mineral Reserve Estimates for the Greenhills Operation, Elkford, British Columbia, Canada: effective date 27 January, 2016.

3.0 Reliance On Other Experts

This section is not relevant to this Report.

4.0 Property Description and Location

4.1 Introduction

The Greenhills Operation is located in the East Kootenay region of southeastern British Columbia, approximately 330 km by road southwest of Calgary, Alberta and about 8 km northeast of the town of Elkford in the southeast corner of British Columbia.

The Project mining centroid is approximately latitude 50° 06' 40" N and longitude 114° 52' 16" W. The plant site is situated at latitude 50° 03' 38.96" N and longitude 114° 51' 15.91" W.

4.2 Project Ownership

The GHO mining activities are conducted under a JV agreement between Teck Coal Partnership and POSCAN, where Teck Coal is Project operator.

Teck Coal and POSCAN own the mine equipment and preparation plant in proportion to their respective JV interests. Under the JV agreement, Teck Coal is the manager and operator of the GHO and takes 80% of all coal produced. POSCAN takes the remaining 20% and pays a quarterly royalty based on the price achieved for GHO coal sales.

4.3 Mineral Tenure

The total Project area is 12,900 ha. The tenure holdings are shown in Figure 4-1 and summarized in Table 4-1.

There is one active surface mining area, referred to as the Cougar pit, Phases 4, and 7. Mining is planned for the Cougar pit Phases 8, and 9, and the Swift (GHO) pit. The Crow Ridge area has an estimated Coal Resource. The Ewin Creek area is at an exploration stage of evaluation.

Mineral title is primarily an Estate in Fee Simple (freehold) land holding legally known as Lot 1, District Lot 4588, Plan NEP11279, Kootenay District, which is a Crown Grant consisting of 9,903 ha.

The Cougar and Swift (GHO) pit phases are located within District Lots NW and E½ 3422, 3423, W½ 6635, 3424 and W½ of W½ 6980 which are Crown Grants consisting of approximately 404 ha of freehold land, and portions of four coal leases: coal leases 389282, 389311, 389275 and 389310 containing 763 ha of coal lands.

The Ewin Creek area consists of Crown Coal License numbers 327805, 327806, 327807 and 327808 which cover an area of approximately 988 ha.

The Crow Ridge area includes Crown Coal License numbers 328001, 327997, 327998, and 327992 covering approximately 842 ha.

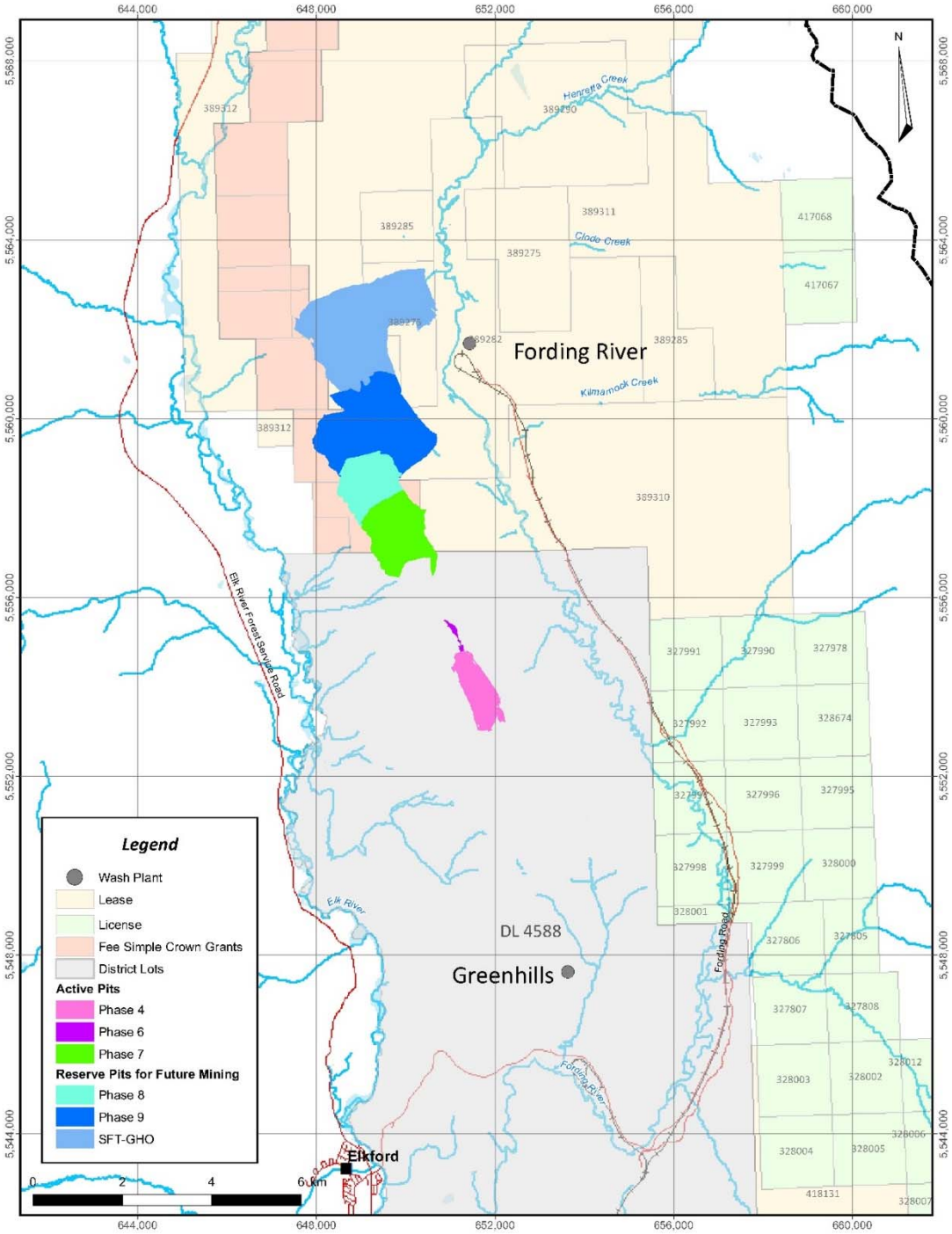

Figure 4-1: Mining Areas

Note: Figure prepared by Teck, 2020

Table 4-1: Mineral Tenure Holdings

Tenure ID	Parties	Type	Status	Grant Date	Expiry Date	Area (ha)
327805	Teck Coal Limited (100%)	Coal Licence	Active	8/10/1990	8/10/2020	259
327806	Teck Coal Limited (100%)	Coal Licence	Active	8/10/1990	8/10/2020	211
327807	Teck Coal Limited (100%)	Coal Licence	Active	8/10/1990	8/10/2020	259
327808	Teck Coal Limited (100%)	Coal Licence	Active	8/10/1990	8/10/2020	259
327992	Teck Coal Limited (100%)	Coal Licence	Active	3/13/1986	1/31/2021	259
327997	Teck Coal Limited (100%)	Coal Licence	Active	3/13/1986	1/31/2021	259
327998	Teck Coal Limited (100%)	Coal Licence	Active	3/13/1986	1/31/2021	259
328001	Teck Coal Limited (100%)	Coal Licence	Active	3/13/1986	1/31/2021	65
389282 *	Teck Coal Limited (100%)	Coal Lease	Active	5/19/1977	5/19/2028	439
389310 *	Teck Coal Limited (100%)	Coal Lease	Active	5/9/1998	5/9/2028	14
389311 *	Teck Coal Limited (100%)	Coal Lease	Active	01/011974	01/01/2025	119
389275 *	Teck Coal Limited (100%)	Coal Lease	Active	05/09/1999	05/09/2029	191
012-249-602 *	Teck Coal Limited (100%)	Fee Simple	Active	1/1/1901	N/A	9,903
016-720-423 *	Teck Coal Limited (100%)	Crown Grant	Active	1/1/1901	N/A	146
016-733-991 *	Teck Coal Limited (100%)	Crown Grant	Active	1/1/1901	N/A	109
016-720-431 *	Teck Coal Limited (100%)	Crown Grant	Active	1/1/1901	N/A	21
016-733-975 *	Teck Coal Limited (100%)	Crown Grant	Active	1/1/1901	N/A	16
016-734-009 *	Teck Coal Limited (100%)	Crown Grant	Active	1/1/1901	N/A	112
						12,900

The areas that host the Cougar and Swift (GHO) pit phases in proximity to Fording River Operations, as indicated by asterisks in Table 4-1, are a small fraction of the overall leases and Crown Grants, comprising about 1,167 ha in total. The remaining lease area within the Fording Coal Limited ground holdings is administered by the Fording River Operations for operations purposes.

The coal leases and licenses are renewed annually, per the BC *Coal Act*. Crown Grants are an interest in land as a fee simple estate in ownership. These rights are held in perpetuity by Teck Coal as long as the assessed property and mineral taxes are paid annually. All payments were current as at 31 December, 2019.

There are no obligations that must be met on the part of the landowner to undertake or complete any exploration or development work to actively maintain the coal tenures.

4.4 Surface Rights

GHO controls the surface and subsurface coal rights to the properties that are in operation and those that are planned for development.

All GHO operations and associated infrastructure such as tails and waste storage are contained within lands on which Teck Coal owns the surface rights in fee simple (freehold) or located on Crown-granted coal licences and leases which, by virtue of the *Coal Act* sections 9(3)a and 16(3)a, allow Teck Coal, as the Recorded Holder to enter, occupy and use the surface area of the location to produce coal. This surface area is sufficient to contain mining and process plant waste and reject material projected in the current life-of-mine (LOM) plan.

4.5 Water Rights

Teck has eight authorized water licences that cover water diversion and usage. The water usage rights held are sufficient to support the LOM plan.

4.6 Property Agreements

Teck Coal and POSCAN bear all costs and expenses incurred in operating Greenhills in proportion to their respective JV interests.

The JV agreement provided for a review of the terms of the agreement in 2018 and provides for an additional review in 2022. In the event the parties disagree on the continuation of the terms of the agreement, the operational phase will come to an end.

4.7 Royalties and Encumbrances

Coal on Crown land is subject to lease rentals and coal production royalties. Teck is not required to pay royalties on freehold land.

British Columbia levies mineral taxes. There is a two-tier tax system with a minimum rate of 2% on operating cash flow and a maximum rate of 13% on cash flow after taking available deductions for capital expenditures and other permitted deductions.

POSCAN, pursuant to a property rights grant, has a right to 20% of all coal mined from certain defined lands of the GHO until the end of the operational phase of the joint venture. POSCAN pays Teck a royalty for access to other coal reserves owned by Teck that are processed by GHO equipment and facilities. In effect, the POSCAN royalty is levied at the point of the washplant, and the POSCAN royalty applies to 20% of the material that is processed by that plant.

On February 11, 2019, Teck agreed with POSCAN to substantially increase the royalty paid by POSCAN in respect of its 20% share of production.

4.8 Permitting Considerations

Permitting is discussed in Section 20.

4.9 Environmental Considerations

Environmental considerations are discussed in Section 20.

Environmental liabilities for the operations are typical of those that would be expected to be associated with an operating coal mine, including roads, site infrastructure, open pits, and waste and tailings disposal facilities.

Teck Coal, via GHO, is required to rehabilitate disturbed areas after the completion of mining activities. GHO has made provisions to limit environmental liability by reclaiming disturbed areas on an ongoing basis as they become available. Short- and long-term reclamation requirements are reassessed annually, and an annual reclamation plan is submitted to the British Columbia government, as required as a condition of the mine permit (refer to Section 20).

4.10 Social License Considerations

Social licence considerations are discussed in Section 20.

4.11 Comments on Section 4

To the extent known to the QP, there are no other significant factors and risks known that may affect access, title, or the right or ability to perform work on the Project that are not discussed in this Report.

5.0 Accessibility, Climate, Local Resources, Infrastructure, and

5.1 Accessibility

The operations are accessed via Highway 43 through the town of Elkford.

Goods are delivered primarily by transport trucks and occasionally by rail.

Coal from GHO is transported in unit trains from the site loadout facilities via rail lines operated by Canadian Pacific Railways (CPR) or Canadian National Railways (CNR). The final rail destination is either the Westshore Terminals, 1,150 km to the west in Delta, BC, Neptune Bulk Terminals in North Vancouver, BC, or Ridley Terminal at Prince Rupert BC. The CPR and CNR own their own lines and have line sharing agreements in place to expedite traffic in certain areas.

5.2 Climate

The Project area has long, cold winters and short, cool, dry summers.

The climate results from a combination of the continental location, mountainous topography, and westerly maritime air masses that bring moisture-laden air to the area. Local convective storms during summer months can provide significant amounts of precipitation in relatively short periods of time. The area is often dominated by cold continental Arctic air masses and easterly-moving maritime Arctic air masses during the winter, resulting in snowfall. Monthly precipitation varies from a low of 34.9 mm to as much as 69.3 mm.

Temperatures range from a maximum of 24.2ºC to a minimum of -11.3ºC. Temperature and air inversions can occur in winter and fall, respectively.

Pacific frontal systems produce strong south to southwesterly upper-level winds, especially during winter months. Valley winds are governed by valley orientation while mountain top winds are more closely associated with geostrophic winds. In general, the higher the elevation the greater the precipitation values and mean wind speed, and the lower the mean temperature.

Operations are conducted year-round.

5.3 Local Resources and Infrastructure

Coal mining activity has been ongoing in the region for many years, and the infrastructure is well developed, including all-weather roads and railroads.

Mining personnel are recruited from across Canada, with most living in the Elk Valley, within the towns of Elkford, Sparwood or Fernie.

Additional information on Project infrastructure is included in Section 18.

5.4 Physiography

The operations are situated in the Kootenay Region of the Northern Rocky Mountain physiographic province, within the Elk River valley. Elevations range from about 1,300 masl in the valley floor to about 2,250 masl at the upper extent of the mine.

Vegetation varies with elevation; valley bottoms are dominated by Rocky Mountain Douglas fir, lodgepole pine and trembling aspen. Mountain slopes typically host Engelmann spruce, lodgepole pine, western larch and trembling aspen. Higher elevations are treeless.

The major river system in the Project area is the Elk River, which follows an irregular course with many side channels. The river occupies a broad floodplain that is approximately 1 km wide but constricted in places by alluvial fans.

5.5 Comments on Section 5

In the opinion of the QP:

- The existing local infrastructure, availability of staff, methods whereby goods are transported to and from the Project area are well-established and well understood by Teck, and can support the declaration of Coal Resources and Coal Reserves, and supports the mine plan;
- There are surface rights to support the mine plan (refer to discussion in Section 4.4);
- Within the mineral leases, there is sufficient area for the infrastructure that supports current operations, and infrastructure requirements that may be needed for future mining operations (refer to discussion in Section 18).

Operations are conducted year-round.

6.0 HISTORY

6.1 Exploration History

George M. Dawson of the Geological Survey of Canada identified the coal measures in Fording River valley in 1886. Mining operations commenced in 1897, when the Crow's Nest Pass Coal Company was established to mine coal in the East Kootenay. Coal and surface rights covering about 110,000 acres was granted to the Crow's Nest Pass Coal Company in 1898. This grant included District Lot 4588, which covers the area of the current Greenhills mining operation. The Crow's Nest Pass Coal Company changed its name to Crowsnest Industries in 1965.

During 1967, Kaiser Steel Corp. acquired the mining rights to a selected two-thirds of the Crowsnest Industries' land holding. Kaiser Steel Corp. was incorporated as a BC company in 1968, and in 1969, underwent a name change to Kaiser Resources Ltd. (Kaiser Resources). Kaiser Resources commenced ground-based exploration activities in the Ewin Creek coal licenses; however, by the early 1970s the main activity was focused on the Greenhills fee simple lands. Work included geological mapping, trenching of coal showings, and sampling of both coal outcrops and coal exposed in the trenches. The earliest recorded drilling in Greenhills was in the mid-1970s. Drilling at that time was a combination of diamond core (NQ and HQ diameters) and single wall rotary.

Kaiser Resources was purchased by B.C. Resources Investment Corporation in 1980, and the merged entity was renamed Westar Group Limited, with the coal division being assigned to a new company, Westar Mining Limited (Westar Mining).

Kaiser Resources and Westar Mining excavated 40 adits between 1969 and 1980, which covered Ewin Creek, Burnt Ridge (now administered by Teck Coal's Line Creek Operations), Crow Ridge, and the Cougar pits (Phases 3–6) on Greenhills Ridge. These adits were used to provide bulk samples for metallurgical testwork. In the 1980s, reverse circulation (RC) drilling was introduced and remains the primary form of drilling supplemented by geotechnical diamond drilling and large diameter coring.

A JV was established between Westar Mining (80%) and POSCAN (20%), with the Greenhills operations commencing in 1983. Mining continued until October 1992, when Westar Mining Limited filed for court protection from its creditors under the Companies' Creditors Arrangement Act, a Canadian business reorganization law. In December 1992, Fording Coal Limited, a subsidiary of Canadian Pacific Limited, purchased the Westar Mining Limited interest in the JV. Mining re-commenced in February 1993. In 2001, Fording Coal Limited was re-organized to form Fording Inc.

During 2003, a multi-party agreement was announced that saw Fording Inc. converted into an income trust, the Fording Canadian Coal Trust, and the creation of a coal partnership consisting of a number of metallurgical coal mining properties, which included GHO. As a result of this agreement, a partnership, the Elk Valley Coal Partnership (EVCP), since renamed to Teck Coal Partnership, controlled the metallurgical coal. EVCP held 80% of the JV, while POSCAN retained a 20% ownership interest.

On October 30, 2008, Teck acquired all the assets of the Fording Canadian Coal Trust, thus making Teck the sole owner of EVCP.

6.2 Production

The production since mine startup is provided in Table 6-1.

Table 6-1: Production History

Year	Westar Mining Limited	Fording Coal Limited	Elk Valley Coal Corporation	Teck Coal
1983	962,400	—	—	—
1984	2,510,600	—	—	—
1985	2,360,300	—	—	—
1986	2,435,400	—	—	—
1987	3,152,200	—	—	—
1988	3,077,900	—	—	—
1989	3,087,200	—	—	—
1990	2,977,300	—	—	—
1991	3,441,500	—	—	—
1992	2,742,700		—	—
1993	—	1,809,400	—	—
1994	—	3,138,200	—	—
1995	—	3,800,700	—	—
1996	—	4,176,300	—	—
1997	—	4,421,700	—	—
1998	—	4,026,400	—	—
1999	—	4,239,200	—	—
2000	—	4,399,900	—	—
2001	—	4,906,500	—	—
2002	—	3,780,000	—	—
2003	—	—	4,070,800	—
2004	—	—	4,927,726	—
2005	—	—	5,024,312	—
2006	—	—	4,101,467	—
2007	—	—	4,052,026	—
2008	—	—	4,625,342	—
2009	—	—	—	3,450,191
2010	—	—	—	4,653,179
2011	—	—	—	4,963,620
2012	—	—	—	4,659,702
2013	—	—	—	5,074,494
2014	—	—	—	5,321,208
2015	—	—	—	4,980,873
2016	—	—	—	5,778,344
2017	—	—	—	6,081,761
2018	—	—	—	6,096,053
2019	—	—	—	6,252,022

7.0 Geological Setting and Mineralization

7.1 Regional Geology

The southeastern portion of the Canadian Cordillera contains a complex history of plate tectonic processes and terrane accretion (Figure 7-1).

Foreland basin subsidence during the Mesozoic resulted in a coarsening-upwards sequence of deep-water basin to coastal plain sandstones, shales, and coals being deposited adjacent to the uprising Canadian Cordillera in the Jurassic to Early Cretaceous. The Fernie Formation and Kootenay Group represent the first of a series of coarsening-upwards clastic wedges that were deposited in the foreland basin. Thrust faulting resulted in the wedges propagating to the east, and structural repetition of the coal seams within the Mist Mountain Formation of the Kootenay Group (Katay, 2017). Coal forms between 8–12% of the total thickness of the Mist Mountain Formation at most locations.

The Kootenay Group sediments were affected by the late Cretaceous to early Tertiary Laramide Orogeny, which produced a number of north–south-trending thrust faults. Subsequent northerly-trending normal faults have also displaced and further divided the sedimentary units. On a local scale the geology varies from broad open synclines to tight folds complicated by thrusts that often repeat the coal section.

7.2 Project Geology

7.2.1 LITHOLOGIES

The GHO are located within the Elk Valley Coalfields. The coal measures are situated within the Upper Jurassic to Lower Cretaceous Kootenay Group sediments.

From earliest to latest, the Kootenay Group includes:

- Morrissey Formation: sandstones; subdivided into the Weary Ridge and Moose Mountain Members; 20–80 m in thickness;
- Mist Mountain Formation: interbedded sandstone, siltstone, mudstone, shale and thin to thick seams of bituminous to semi-anthracite coal; 450–550 m in thickness;
- Elk Formation: interbedded sandstone, siltstone, mudstone, shale and locally thick beds of chert-pebble conglomerate and thin seams of high volatile bituminous coal; 350–450 m in thickness.

The stratigraphy within the Project area is summarized in Table 7-1 and shown in Figure 7-2.

The Mist Mountain Formation contains approximately 25 coal seams of potential economic interest, consisting of medium to high volatile bituminous coal.

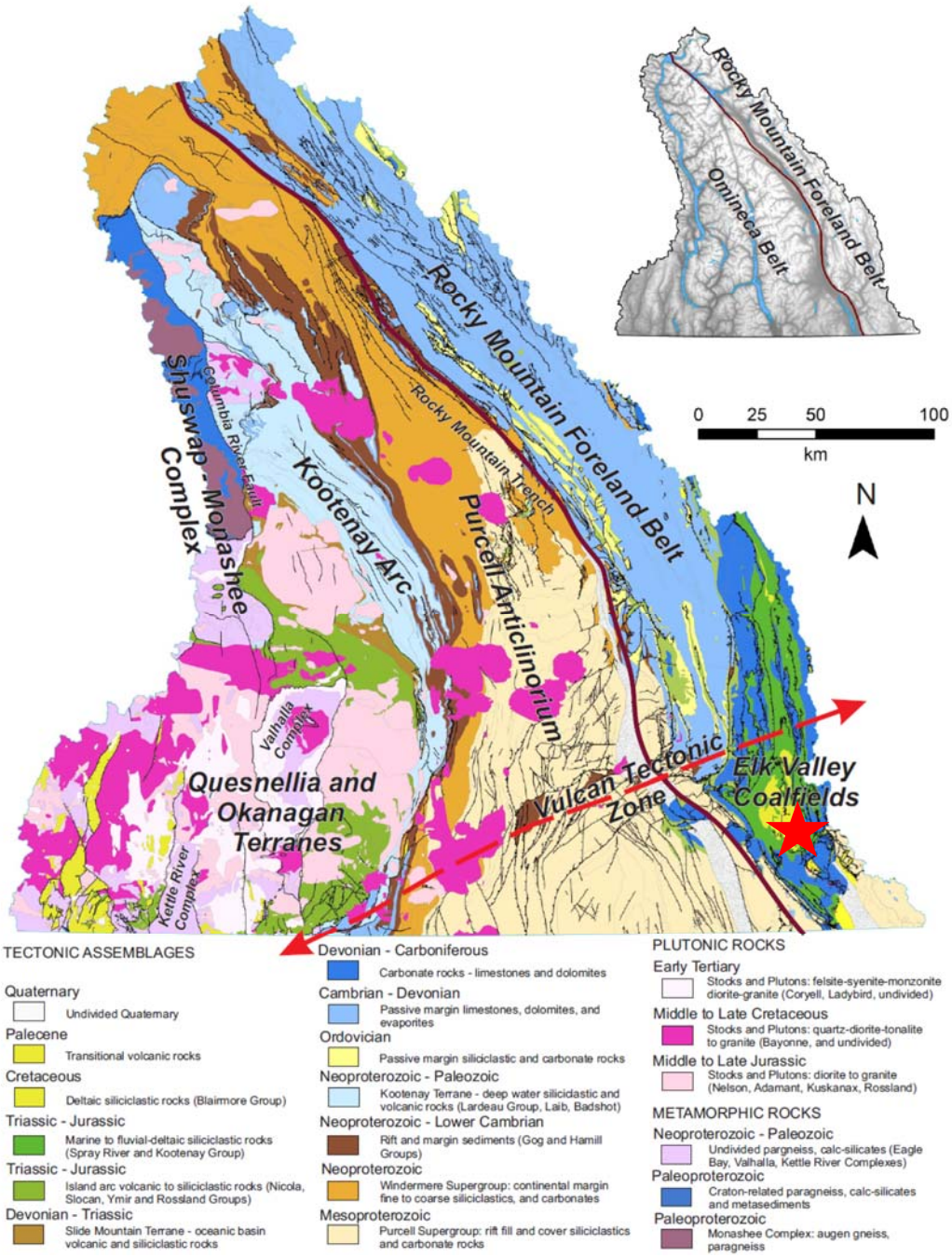

Figure 7-1: Regional Geology Plan

Note: Figure from Katay, 2017.

Table 7-1: Project Stratigraphy

Period	Litho-Stratigraphic Units			Principal Rock Types
Recent				Colluvium
Quaternary				Clay, silt, sand, gravel, cobbles
Lower Cretaceous	Blairmore Group			Massive bedded sandstones and conglomerates
Lower Cretaceous to Upper Jurassic	Kootenay Group	Elk Formation		Sandstone, siltstone, shale, mudstone, chert pebbles
		Mist Mountain Formation		Sandstone, siltstone, shale, mudstone, multiple coal seams
		Morrissey Formation	Moose Mountain Member	Medium to coarse grained quartz–chert sandstone
			Weary Ridge Member	Fine to coarse grained, slightly ferruginous quartz–chert sandstone
Jurassic	Fernie Formation			Shale, siltstone, fine-grained sandstone
Triassic	Spray River Formation			Sandy shale, shale, quartzite
	Rocky Mountain Formation			Quartzites
Mississippian	Rundle Group			Limestone

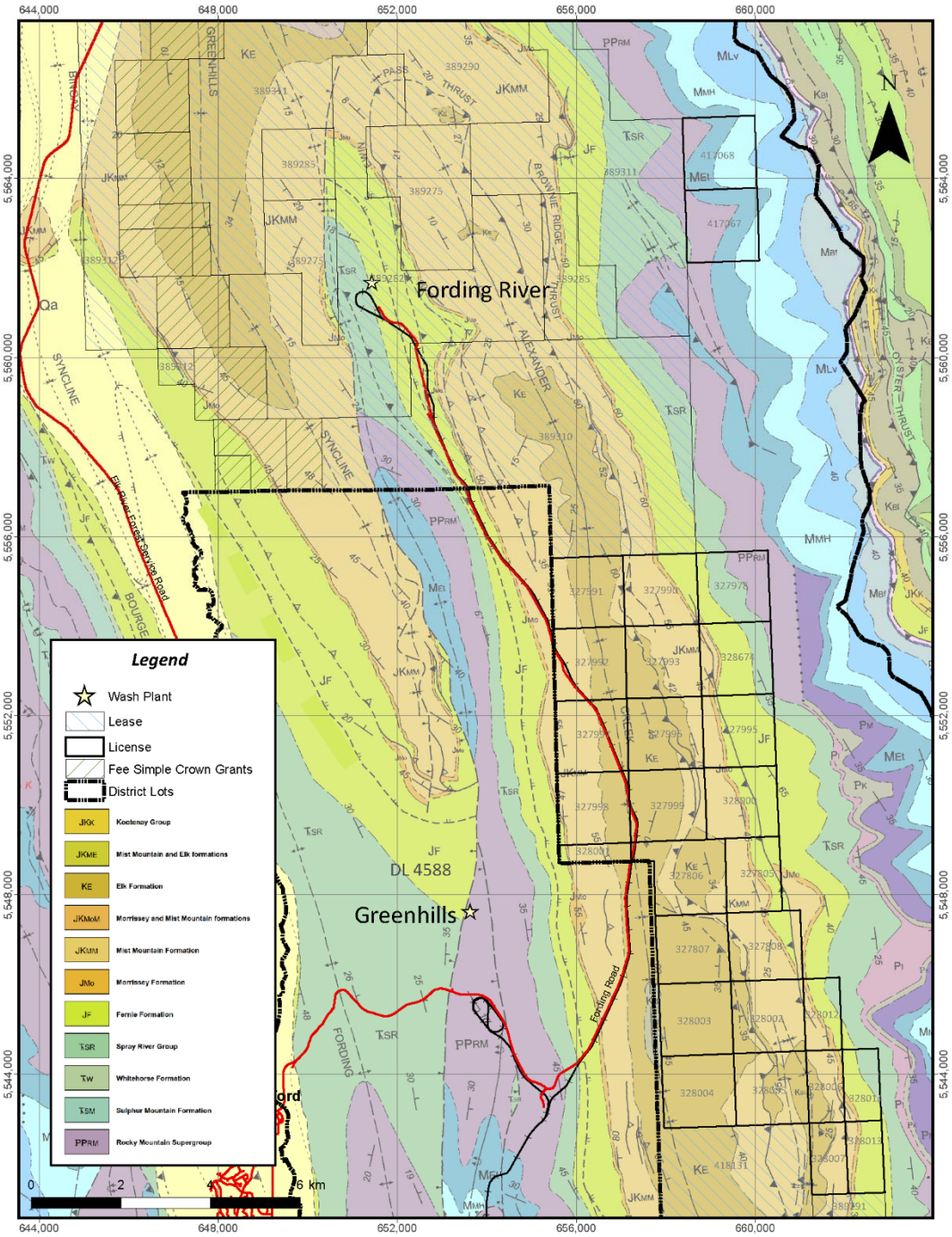

Figure 7-2: Project Geology Plan

Note: Figure prepared by Teck, 2020.

7.2.2 STRUCTURE

Within the coal measures, there are three structurally-separated coalfields, the Elk Valley, Crowsnest, and Flathead coalfields. The Elk Valley coalfield is located within the Alexander Creek and Greenhills synclines, which are separated by a normal fault. The western edge of the Mist Mountain Formation, and therefore the distribution of the Elk Valley coalfield, is controlled by the Bourgeau Fault (refer to Figure 7-2). To the east of this fault, the Greenhills syncline plunges to the north, and its eastern limb is truncated by the north-trending normal Erickson fault. East of the Erickson fault is the Alexander Creek syncline, which is in turn cut by the Ewin Pass thrust fault (Ryan, 2001).

The coal seams in both synclines are typically fragmented and sheared. Thicker seams are generally lower in the section, tend to host major thrusts, and therefore are frequently extensively sheared (Ryan, 2001).

Greenhills Syncline

The east limb of the asymmetric Greenhills syncline dips westerly at 15–25°, except in areas near the Erickson Fault, where 45–55° dips are common. The west limb exhibits much steeper dips, commonly in the 35–45° range. The Greenhills Syncline plunges northward (340–350°), at less than 5°, and then thins out and seems to end to the north in the area of the Osborne Creek Depression (Teck Coal, 2011).

Erickson Fault

The Erickson Fault, which locally runs along the base of the Greenhills Range, west of the Fording River, is one of the major regional faults. From south to north, this westerly dipping (40–70°) normal fault brings Mist Mountain strata progressively into contact with Rundle, Rock Mountain, Spray River, Fernie and Morrissey strata. The downthrown block is to the west (Teck Coal, 2011).
Near the south end of Lake Mountain, the Erickson Faults begins to “splay” into two zones. The main fault runs along the eastern margin of Lake Mountain, and the subsidiary fault runs to the west and appears to thin out and end northward. The steep northward dip exhibited in the Lake Mountain strata could be due to influence from these flanking “splays” of the fault. The flat-lying region to the north of Lake Mountain (Osborne Creek Depression area) is completely void of outcrop, and the Erickson Fault has not been traced either through or to the north of this area (Teck Coal, 2011).

7.2.3 MINERALIZATION

The Mist Mountain Formation depth of burial ranges from surface exposures to greater than 1,500 m. The coal measures on the GHO property contain bituminous grade coal seams with varying volatile matter contents. The coal quality varies with depth of burial and location along the strike of the deposit. Seams may range in thickness from 1–16 m.

Figure 7-4, Figure 7-5, and Figure 7-6 are cross-sections showing the relative positions of the coal seams in the Cougar pit area. Figure 7-3 shows the locations of the cross-sections in those figures.

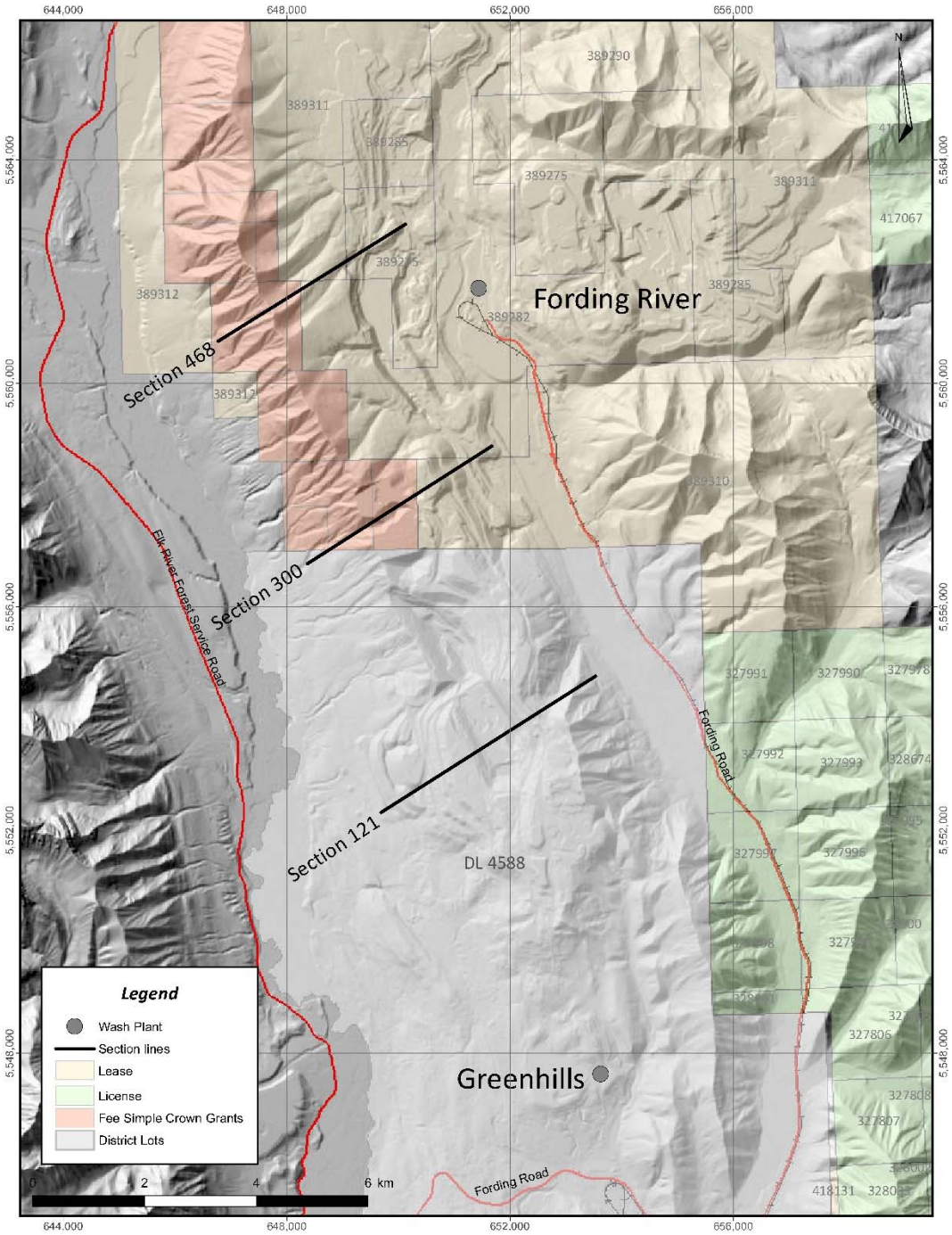

Figure 7-3: Plan Showing Cross-Section Locations

Note: Figure prepared by Teck, 2020.

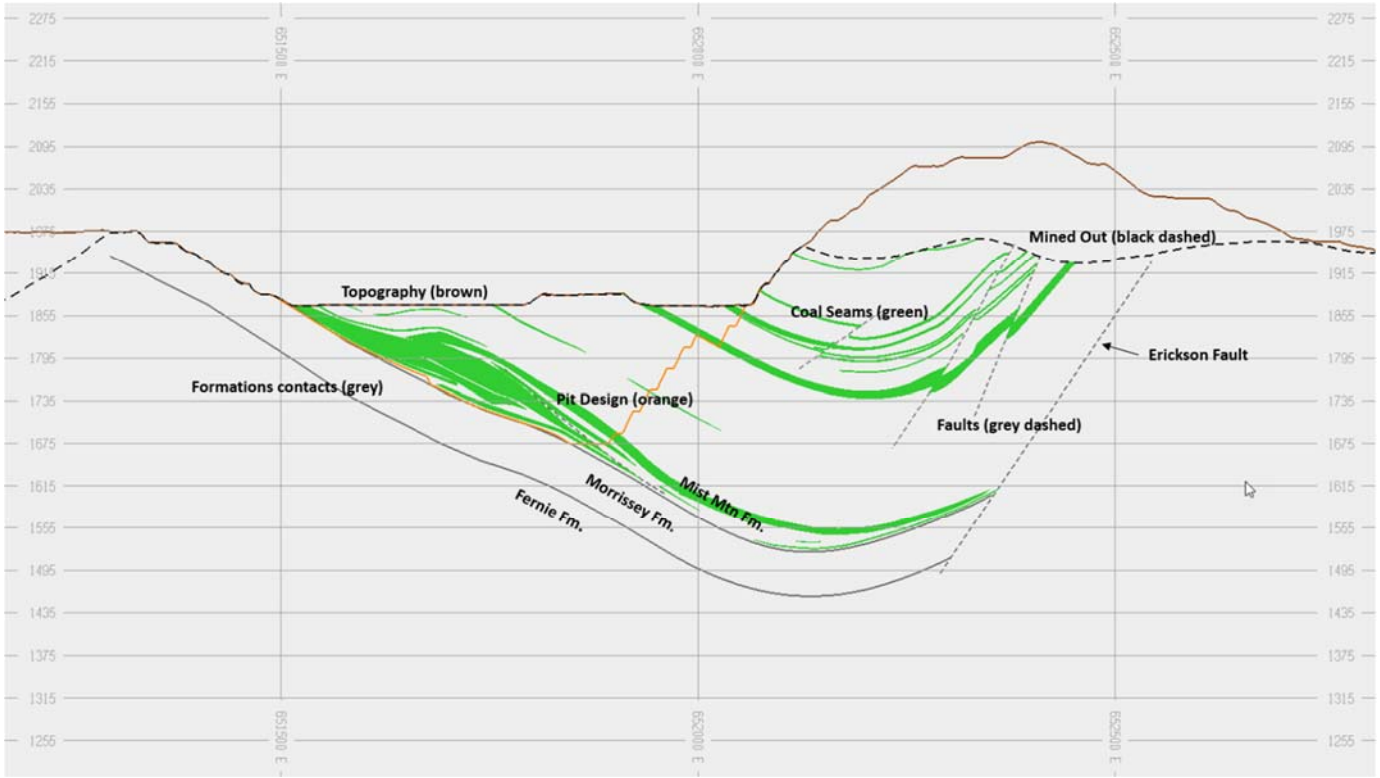

Figure 7-4: Cougar Phase 4–5 Cross-Section #121

Note: Figure prepared by Teck, 2020. Section looks north–northwest. Grid units are in metres.

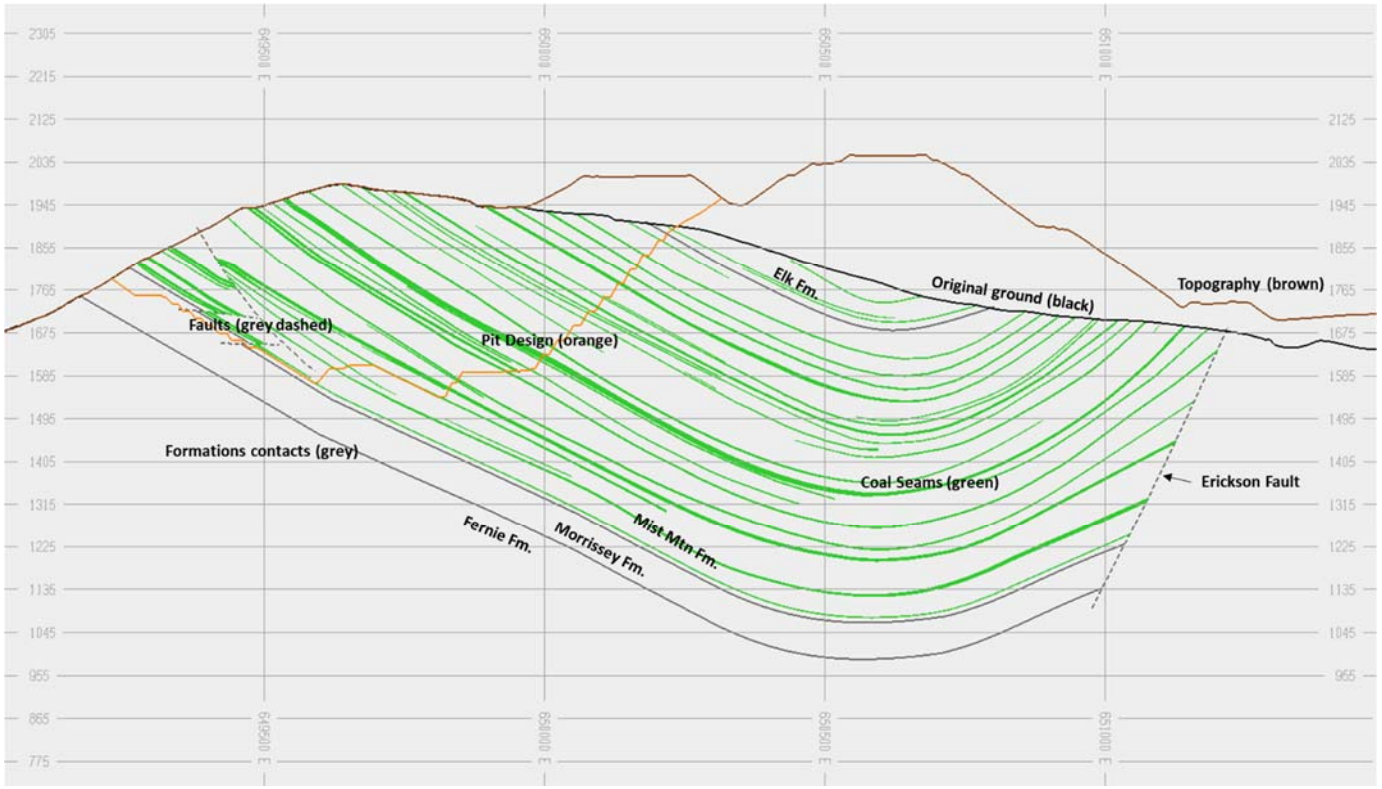

Figure 7-5: Cougar Phase 7–9 Cross-Section #300

Note: Figure prepared by Teck, 2020. Section looks north–northwest. Grid units are in metres.

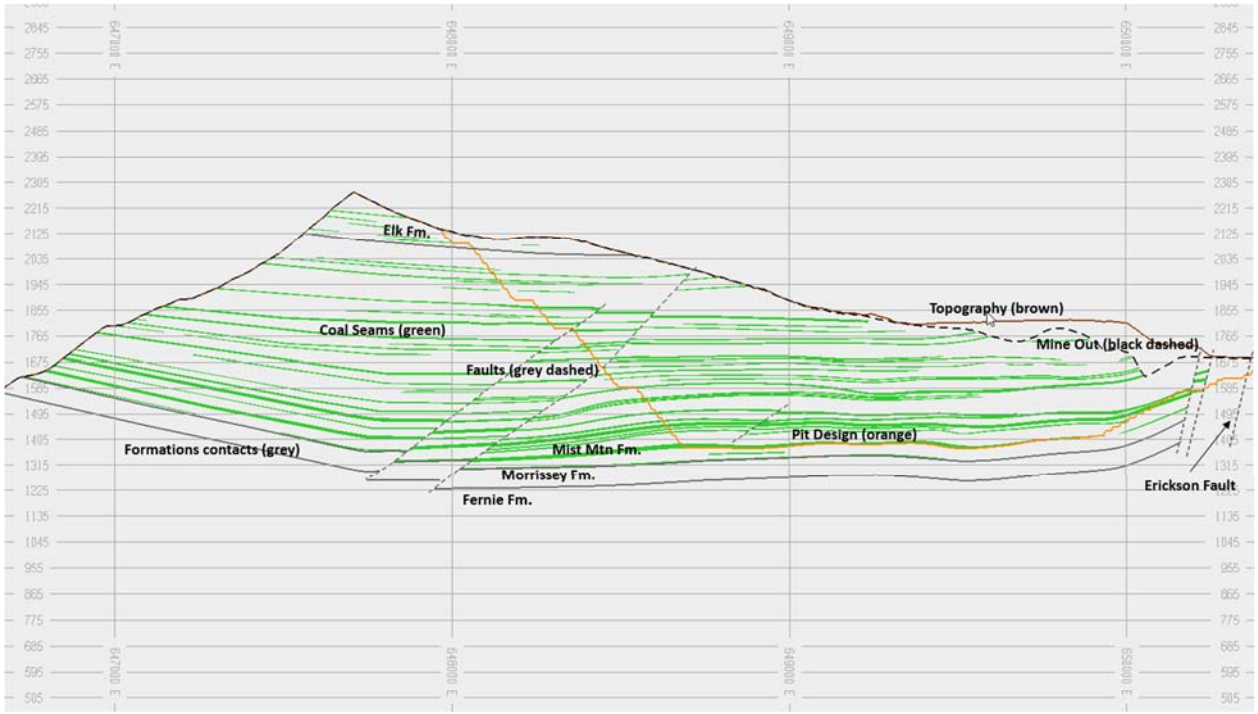

Figure 7-6: Cougar Phase 7–9 Cross-Section #468

Note: Figure prepared by Teck, 2020. Section looks north–northwest. Grid units are in metres.

GHO produces the following coal products as shown on Figure 7-7:

- Hard coking coal (HCC): coke strength after reaction (CSR) 64+;
- Semi-hard coking coal (SHCC): CSR ≤63.

7.3 Prospects

Prospects and targets are discussed in Section 9.

7.4 Comments on Section 7

In the opinion of the QP, the understanding of the deposit setting, lithologies, and geological and structural controls on mineralization is sufficient to support estimation of Coal Resources and Coal Reserves.

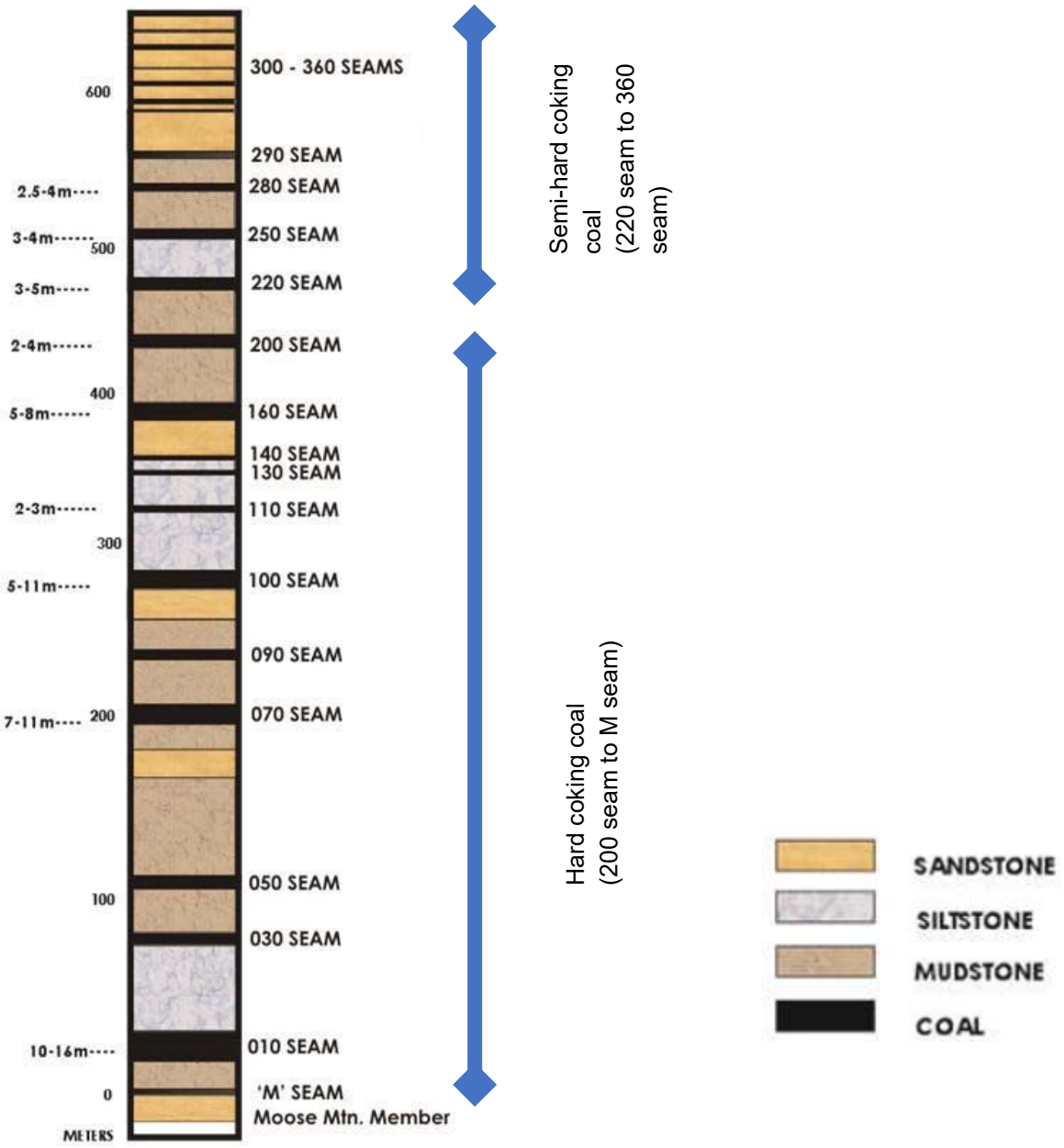

Figure 7-7: Coal Product by Seam

Note: Figure prepared by Teck, 2020.

8.0 Deposit Types

8.1 Overview

Coal deposits originated as peat-forming materials that accumulated at or near their place of growth, within swamps and marshes occurring in deltaic, alluvial and lacustrine environments.

Coals that are suitable for the production of metallurgical coke are referred to as metallurgical coals. Coals that are used to fuel electric power generating plants are referred to as thermal coals. Most of Canada`s metallurgical coal deposits, including the GHO, are located in the Rocky Mountain Ranges of southeastern British Columbia and southwestern Alberta, and in the Inner Foothills Belt of northeastern British Columbia and west–central Alberta.

The ranks of coals, from those with the least carbon to those with the most carbon, are lignite, sub-bituminous, bituminous and anthracite. In addition to carbon, coals contain hydrogen, oxygen, nitrogen and varying amounts of sulphur. High-rank coals are high in carbon and therefore they bare great heat value, but low in hydrogen and oxygen. Low-rank coals are low in carbon but high in hydrogen and oxygen content.

8.2 Deposit Type by Seam Geometry

Coal deposits are characterized by the Geological Survey of Canada as being of four deposit types, based on differences in seam geometry as a result of sedimentary processes during coal deposition, and subsequent deformation. The four types are low, moderate, complex and severe.

The coal measures in the Greenhills area are classified as “complex”. Complex deposits have the following characteristics:

- Have been subjected to relatively high levels of tectonic deformation;
- Tight folds, some with steeply inclined or overturned limbs, may be present, and offsets by faults are common;
- Individual fault-bounded plates generally retain normal stratigraphic sequences, and seam thicknesses have only rarely been substantially modified from their pre-deformational thickness.

8.3 Deposit Type by Mining Method

The Geological Survey of Canada also classifies coal deposits on the basis of the probable extraction method that would be used to recover coal. Classifications include surface, underground, non-conventional, and sterilized. The coal measures in the Greenhills area are classified as “surface”. Surface deposits are amenable to extraction by removal of overburden from the surface using truck/shovel, dragline or other surface mining techniques.

8.4 Comments on Section 8

The coal deposits of the GHO are typical of those found within the Canadian Inner Foothills and Rocky Mountain areas, and have been subjected to a relatively high tectonic deformation. Exploration programs that use this setting are considered applicable to the Project area.

9.0 EXPLORATION

9.1 Grids and Surveys

GHO uses the NAD27/ UTM zone 11N grid system with truncated coordinate values. All data is recorded with these truncated coordinates. The topography surface used to generate the Coal Reserve and Coal Resource estimate was built in MinePlan 3D software using aerial data collected from a drone flight of the property on August 26, 2019. The accuracy of these data is approximately ±5 cm.

9.2 Geological Mapping

Outcrop mapping commenced in the mid-1970s by the B.C. Ministry of Energy, Mines and Petroleum. The following is a summary list of this work that was primarily completed prior to the startup of mining at the GHO in 1983:

- Pearson, D.E. and Grieve, D.A., 1979: Elk Valley Coalfield (82J/2). Geological Fieldwork 1979, B.C. Ministry of Energy, Mines and Petroleum Resources, Paper 1980-1, pp. 91–96;
- Grieve, D.A. and Pearson, D.E., 1980: Geology and Rank Distribution of the Elk Valley Coalfield; in Geology in British Columbia 1977-1981, B.C. Ministry of Energy, Mines and Petroleum Resources, pp. 17–23;
- Grieve, D.A. and Pearson, D.E., 1982: Geology of the Greenhills Range, Elk Valley Coalfield; B.C. Ministry of Energy, Mines and Petroleum Resources, Preliminary Map 51;
- Grieve, D.A. and Price, R.A., 1987: Geological Setting of the South Half of the Elk Valley Coalfield; B.C. Ministry of Energy, Mines and Petroleum Resources, Preliminary Map 63.

Kaiser Resources geologists completed 1:5,000 scale mapping over the entire property in the period 1969–1980.

In-pit mapping is currently carried out on a daily basis by the Coal Quality Geologist, and hand-drawn onto an approximate 1:100 scale map. Information collected includes:

- Seam thicknesses;
- Waste rock splits;
- Significant structures;
- Coal type; metallurgical vs oxidized;
- Raw ash of coal piles.

This information is used to minimize coal loss and dilution, such that no excess rock is added, and no economic coal is left behind.

9.3 Geochemical Sampling

Sampling by type and location is provided in Table 9-1.

Table 9-1: Surface Sampling

Area	Adit	Trench	Outcrop	Total
Cougar Phase 4–6	19	192	24	235
Cougar Phase 7–10			42	42
Other Cougar	3	2		5
Ewin Creek	10		10	20
Crow Ridge	2	2		4
Total	***34***	***196***	***76***	***306***

Major seams were bulk-sampled using the adit method prior to commencement of mining. The adits were driven to obtain samples for various analyses including quality parameters, carbonization and wash curve predictions for wash plant design.

Sampling for potentially acid generating (PAG) waste rock is collected from a representative portion of blasthole cuttings that are drilled below the basal coal seam. The purpose is to delineate areas where “PAG” rock exists as it requires specific spoiling instruction. The analysis of PAG is completed by a “fizz test” using hydrochloric acid. The analysis is completed at Elk Valley Environmental Services in Sparwood, British Columbia or Teck Coal’s GHO on-site laboratory.

9.4 Geophysics

The downhole geophysics performed during logging is described in Section 10.

9.5 Petrology, Mineralogy, and Research Studies

Petrographic analysis is carried out, on an as-required basis, by an independent laboratory, typically David E. Pearson & Associates Ltd., located in Victoria, British Columbia.

9.6 Comments on Section 9

In the QP’s opinion, the exploration programs completed to date are appropriate to the style of the deposit. Drill data supersedes the data collected during the surface sampling campaigns.

10.0 DRILLING

10.1 Introduction

As at 31 December, 2019, the Project database contained 28,643 drill holes, consisting of 5,503 RC drill holes (714,409 m), 22,924 production holes (549,927 m), and 163 core holes (43,939 m). Drilling for bulk sample collection includes: 18 large diameter reverse flood (LDRF) rotary drill holes (2,459 m) and 35 large diameter core (LDC) drill holes (3,603 m). Collar locations are shown in Figure 10-1.

A subset of the drill hole project database for Cougar Phases 4 to 10, extracted as of 11 April, 2019, was used to populate coal seam quality data for the 3D block model used in estimating Coal Resources and Coal Reserves. This database subset includes 5,739 drill holes (117,308 m), consisting of 5,328 RC drill holes (107,202 m), 210 production holes (3,011 m), and 152 core holes (4,850 m). Drilling for bulk sample collection includes 31 LDC holes (1,660 m) and 18 LDRF holes (585 m). The database that supports the Coal Resource estimate for Crow Ridge consists of 60 RC drill holes. The drill data for Ewin Creek consists of only16 RC drill holes, and no resource is estimated for this area. Note that 56 fewer RC holes were used to estimate resources than reserves in the Cougar Phase 7 area, due to a drill hole extraction error.

Drill holes in the 3D block model were filtered from the Project database based on the following conditions:

- To ensure the same dataset was used to align the geology with the 2019 LOM plan;
- Model boundary limits;
- Data confidence;
- Drill holes without quality data (e.g. production holes).

10.2 Drill Methods

Exploration drilling is typically phased, as follows:

- Primary phase or step-out drilling is conducted in areas that are somewhat remote from current mining areas, on which no previous exploration drilling activity has occurred;
- Follow-up drilling is used to assess the continuity of the coal seams, provide accurate correlations between the primary phase drill holes and supply additional coal quality information. This typically consists of a program of shallower (250–400 m) RC holes spaced at 150–250 m intervals, depending on the anticipated structural complexity of the area;
- Infill drilling provides geological and insitu coal quality information at sufficient detail to allow completion of the final mine design. Infill drill holes are typically shallow (100–200 m) and closely spaced, with distances at 50–100 m, depending on the structural complexity.

In-pit drilling is conducted to provide detailed and accurate coal seam contours and insitu quality ash data for the next approximately 18–24 months of mining operations. The objective is to have drill holes intercepting the coal seam or seams at an approximate 75 m spacing along the strike of the seam.

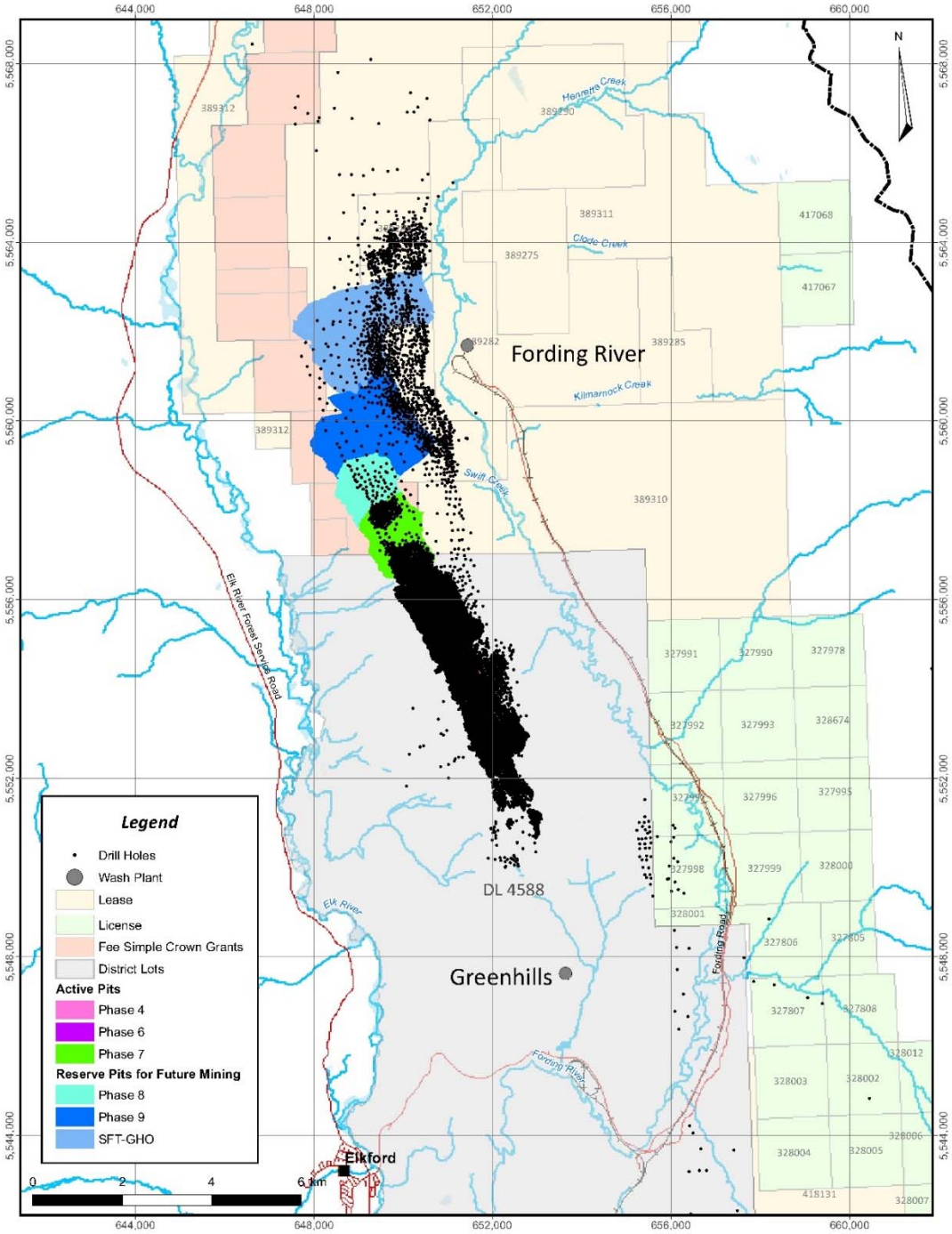

Figure 10-1: Drill Collar Location Plan

Note: Figure prepared by Teck, 2020.

Production drill test holes are selected according to the same criteria as the in-fill exploration holes, but these drill holes are typically designed to intersect the coal seam at 50 m spacing along the seam strike.

Currently most of the exploration drilling is RC rotary drilling with centre-sample return. Some core drilling for calibration and control or geotechnical purposes is also conducted.

LDRF was historically used to collect bulk samples of seams for coking characteristic analysis. The core diameter of LDRF holes was approximately 0.5 m, and required a RC pilot hole 5–6 inches in diameter. A hammer bit was used to ream the pilot hole to the top of the coal seam, at which point a Mill bit was used to retrieve the coal sample. The depth for sample collection was limited to approximately 100 m for this sample recovery method. The LDRF drilling method produced bulk samples of highly variable quality and is superseded by LDC.

LDC drilling involves hammering with a 230 mm drill bit and casing, through the rock above the coal seam to be sampled. Once the coal is reached, the bit is changed, and the coal is cored and recovered intact. Core is placed in core boxes with depth marker blocks added. The core is photographed, logged and a subsample taken to have a secondary lab confirm proximate results. To achieve a 5 t sample, multiple holes are generally cored next to each other at the sample location, and the cores are combined into one large sample at the Birtley Laboratory, prior to being dispatched to Hazen Research Inc. (Hazen) for washing, and then the Canadian Centre for Mineral and Energy Technology (CANMET) Energy Technology Centre for coking.

10.3 Logging and Handling Procedures

10.3.1 GEOLOGICAL LOGGING

Geological logging is done on all core samples collected from the LDC (230 mm core) and HQ (152 mm core) diamond drilling. The information collected from the core logging includes:

- Lithology identification (coal and rock types) and characteristics;
- Recovery estimates;
- Seam quality sample collection;
- Structural identification.

The coal seam data are stored in an acQuire database, additional information is stored in an Excel spreadsheet.

10.3.2 GEOPHYSICAL LOGGING

GHO has a standardized practice for geophysical logging.

All drill holes are geophysically logged, where possible, for gamma-neutron, gamma-density, and caliper. Downhole deviation is only run if the drill hole length is >100 m. Resistivity logs are run if available from

the contractor. Logs such as acoustic televiewer and dipmeter are only performed if additional information is needed; typically, these are undertaken as required for geotechnical purposes.

Geophysical log data, sample data and driller's seam picks are used to determine seam intercepts. If geophysical logs are not available, the driller's picks are used, but with a lower assigned level of confidence.

10.4 Recovery

Since 2010, the drill crew has been using a 325-mesh screen while recovering samples to maximize recovery. In the past coarser screens were used which resulted in greater sample loss.

Recoveries on RC samples are calculated in the acQuire database and are based on sample length, drill hole diameter and specific gravity of the sample. The historical average recovery for RC samples has been 85%.

10.5 Collar Surveys

Collar surveys are performed as follows:

- Production drill holes: All collar locations are surveyed with the onboard drill global positioning system (GPS) instrument, or less frequently collected with a Real Time Kinetic (RTK) GPS Rover. Locations are automatically entered into the acQuire drill hole database;
- Exploration drill holes: All collar locations are surveyed in GHO Mine grid (truncated UTM NAD 27) with an RTK GPS, and locations are entered into the acQuire drill hole database.

10.6 Down Hole Surveys

Down hole surveys are completed as part of the borehole geophysical program if the drill holes are longer than 100 m. This is completed by a third-party contractor.

10.7 Drilling Since Database Close-Out Date

A total of 55 RC holes (23,019 m) have been completed since the database closeout date for Coal Resource estimation. Of this total 16 drill holes were completed for geotechnical purposes, but were sampled for quality when coal was present. Six sites in Cougar Phases 4, 7, and 8 were subject to LDC drilling (1,232 m) to obtain coking coal samples.

The QP considers that this new drilling should have no material effect on the overall tonnage and coal quality estimates, but represent minor upside potential for Coal Resource estimation when incorporated into an updated model.

10.8 Sample Length/True Thickness

Seam true thickness is calculated based on drilled thickness, deviation surveys and dip information. On average, the true seam thickness is less than the drilled seam thickness, depending on the local orientation of the coal seam orientation and the angle of the drill hole.

10.9 Comments on Section 10

In the QP's opinion, the quantity and quality of the lithological, geotechnical, geophysical, collar and downhole survey data collected in the exploration, infill and production drill programs completed are sufficient to support Coal Resource and Coal Reserve estimation.

There are no material drilling, sampling or recovery factors known to the QP that could materially impact the accuracy and reliability of the results, and therefore impact the Coal Resource and Coal Reserve estimation.

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling Methods

11.1.1 RC DRILL HOLES

The RC sampling protocol consists of the following:

- When the coal seam is reached, down feed must be stopped immediately, and the depth recorded to the nearest 0.1 m. This depth is the start point for the first 0.5 m sample;
- Drill for 0.5 m, and then stop. All material collected on the screen from the 0.5 m interval is be bagged, and the sample tagged;
- When the bottom of the coal seam is reached, a final 0.5 m interval below the bottom of the coal seam is drilled. The material is bagged regardless of its composition (i.e. shale, siltstone, and sandstone).

The 0.5 m interval is the maximum sample interval. Standard protocol is that if, within the 0.5 m interval the sample changes from coal to rock, or vice versa, the rock and coal must be bagged separately. The samples are collected on a 325 mesh screen on a portable shaker table and bagged in plastic or cloth bags depending on dry or wet coal respectively.

During 2019, raw samples were refrigerated, with clean composites being frozen, while awaiting analysis.

11.1.2 CORE HOLES

Core is downloaded from the core tube into a core tray lined with plastic. No in-field washing is conducted. Footage markers are placed in the core box, at the end of each cored interval. Core boxes are lidded, then transferred to the logging and sampling facility.

During the 'logging' process, care is taken in handling the core, in particular, washing the drill mud from the core so as to keep disturbance to a minimum. Samples are taken in 1 m increments for each coal seam, and placed into separate bags, which are stored in such a way as to minimize sample disturbance prior to shipment to the laboratory.

11.1.3 BULK SAMPLES

Bulk samples are required to obtain washability and carbonization data for coal seams from new mining areas to reduce risk.

Bulk samples can be collected via a test pit, an adit, LDC, or LDRF drilling. The objective is to obtain an unoxidized, representative sample of the coal seam in a manner that best reflects the method by which the seam will be mined; i.e. if the seam is to be mined by open pit truck/shovel, all rock partings of ≤0.9 m vertical

thickness are included in the sample. Thicker partings are excluded. A minimum sample size of 5 t is required for pilot plant washability.

Modern bulk sampling uses samples obtained via LDC drilling. Historically, adits, test pits or LRDF drilling were used.

Adit sampling typically has the adit driven in the direction of strike, along the seam footwall. The tunnel size may vary slightly according to the equipment being used; but 2 m x 2 m dimensions are common. Grab samples are taken after each blasted round is removed (approximately 2 m of advance). These samples are analyzed for % ash and F.S.I. The sample site is reached when three successive rounds of samples showing high and stable F.S.I. have been obtained. A raise or drift is driven through the seam, to the hanging wall; making the entire seam thickness available for sampling. A 1 m interval either side of the footwall and hanging wall of the seam is required to be exposed. A channel sample is taken from hanging wall to footwall, including or excluding rock partings as dictated by the anticipated mining method. The channel size is determined by the dimensions required to obtain a 5 t sample.

Test pit sampling commences with drilling closely-spaced (10 metre intervals) RC drill holes inward from subcrop until a full seam thickness of unoxidized coal is encountered. The test pit is designed to expose the top of the seam at this pre-determined sample point, allowing sufficient manoeuvring room for sampling equipment (hydraulic backhoe). A trench is excavated to the footwall at the sample point, taking care to expose the entire seam thickness, and a 5 t channel sample taken.

11.1.4 POTENTIALLY ACID GENERATING MATERIAL SAMPLING

Samples are taken of blasthole cuttings of waste rock stratigraphically below the basal seam to delineate areas containing potentially acid-generating (PAG) and non-acid generating (NAG) materials. PAG material must be separately stored. Samples are typically 1–5 kg in size. The samples can be analysed for selenium content.

11.2 Density Determinations

Density estimation and assignment to the model blocks from drill holes is completed using a specific gravity formula. This formula estimates the specific gravity (SG) value of coal based on the ash value results received from the laboratory. Laboratory determinations use ASTM D167 “Standard Test Method for Apparent and True Specific Gravity and Porosity of Lump Coal”. The average SG value from the 2019 quarterly reconciliation data is 1.41.

The formula has been verified for use at GHO through analysis of a number of samples that compared actual SG values determined in the laboratory against SG values determined using the SG formula.

SGs are calculated on a block-by-block basis using interpolated and calculated ash values. The calculation is:

- SG = 211.43/(172.08 - ash%).

11.3 Analytical and Test Laboratories

Laboratory details include:

- Loring Laboratories Ltd. (Loring): Independent. Located in Calgary, AB. Holds ISO 9001 accreditation for selected analytical techniques. Used from 2009 to December 31, 2019;
- Pearson & Associates Ltd (Pearson): Independent. Located in Victoria, BC. Petrographers accredited by International Committee for Coal and Organic Petrology. Used from 1981 to December 31, 2019;
- Gwil Industries (Gwil): Independent. Located in Calgary, AB. Certified under the Vanguard Solutions Proficiency Testing Program. Used from 1982 to December 31, 2019.
- ALS Global: Independent. Located in Calgary, AB. Certifications not recorded in the Project database. Used from 2011–2017;
- Elk Valley Environmental Services (EVES): Independent. Located in Sparwood, B.C. Participates in bi-annual round robin testing through quality assurance reviews. Used from 1982 to December 31, 2019;
- Bureau Veritas: Independent. Located in Burnaby, BC. Holds ISO 17025 accreditation for selected techniques. Used from February 2013 to December 31, 2019;
- Teck Coal: Not independent; is the operations laboratory. Not accredited. Used from ~1983 to December 31, 2019;
- Hazen: Independent. Located in Golden, CO., USA. Holds state regulatory agencies certification and Environmental Protection Agency (EPA) credentials. Pilot scale facilities used to process bulk raw coal samples and wash to clean coal specifications. Used from ~ 2017 to December 31, 2019;
- CANMET: Independent. Located in Ottawa, ON. Member of the Canadian Carbonization Research Association (CCRA). Application to obtain ISO 17025:2005 accreditation in progress. Performs carbonization coke tests on bulk size washed samples of coal. Used from 2008 to December 31, 2019.

The laboratories follow ASTM procedures for coal analysis.

PAG samples are shipped to Elk Valley Environmental Services in Sparwood for Fizz Test analysis. The QA/QC on PAG samples is undertaken at Bureau Veritas.

The laboratories used in each drill phase are summarized in Table 11-1.

Table 11-1: Analytical and Test Laboratories

Zone/Area	Coal Analysis	Laboratories Used
Cougar phase 4–6	*Mini-wash + full analysis	EVES, Loring, Pearson, Gwil, Teck Coal, ALS Group, Hazen, CANMET
Cougar phase 5	*Mini-wash + full analysis	EVES, Loring, Pearson, Gwil, Teck Coal, ALS Group
Cougar phase 7	*Mini-wash + full analysis	EVES, Loring, Pearson, Gwil, Teck Coal, ALS Group, Hazen, CANMET
Cougar phase 8	*Mini-wash + full analysis	EVES, Loring, Pearson, Gwil, Teck Coal, Hazen, CANMET
Cougar phase 9–10	*Mini-wash + full analysis	EVES, Loring, Pearson, Gwil, Teck Coal
Crow Ridge	*Mini-wash + full analysis	Pearson, Gwil, Teck Coal
Ewin Creek	*Mini-wash + full analysis	Pearson, Gwil, Teck Coal

Note: *. Includes ash, light transmittance %, calorific value, volatile matter, reflectance max, sulphur, petrography, phosphate, proximate, rheology, and mineral ash analysis.

11.4 Sample Preparation and Analysis

Collection of samples is carried out by the drill contractor and samples are delivered directly to the secure sample storage area adjacent the Teck Coal GHO laboratory. Samples are securely stored until either analyses performed by the Teck Coal laboratory are complete, or the samples have been shipped to an external laboratory.

All sample collection and processing are regularly evaluated by Teck Coal geologists.

11.4.1 SAMPLE PREPARATION

Prior to 2014, RC samples were delivered to the Teck Coal laboratory by the drill crew and the laboratory personnel processed the samples in the following manner:

- Sample intercepts were recorded from the sample tag in each bag. Each increment was weighed and recorded. These incremental weights were used to calculate sample recovery;
- Samples were coned and quartered, and an appropriate size sample was extracted. The sample size is dependent on the number of analyses that will be requested. This portion was weighted wet, dried and weighed again to calculate moisture;
- The samples were riffled to quarter allotments. One quarter was pulverized. Ash content and free swelling index (FSI) values were determined;
- The remainder of the sample was retained in case additional analysis was required.

After 2014, all samples were sent to independent third-party laboratories, who used the same sample preparation procedures, and followed ISO and ASTM procedures.

Sample recovery is a determining factor as to whether the sample is representative of the seam. Samples with >20% recovery are assayed depending on the seam thickness and quality of recovery.

A seam with ≤20% sample recovery will only have a raw assay suite completed. The raw assay suite consists of:

- Raw ash, volatile matter (VM), total moisture (TM).

Typically, a full assay suite (proximate analysis) is only carried out on samples with a recovery factor of ≥65%. The full assay suite or consists of:

- Clean ash, fixed carbon (F.C), VM, S, P, FSI, Cl, F, As, Hg.

11.4.2 ANALYSIS

Proximate analysis, rheological testing, and mineral ash analyses were conducted both at Teck Coal and third-party laboratories.

Ash Content

Results of ash analyses are sent to a GHO geologist for review. The geologist usually selects contiguous samples within the coal seam sequence which contain raw ash of 45% on an air-dried basis (adb) or less, and requests a composite analysis of these intervals which are then defined as “coal”.

Composite Sample Analysis

The composite sample is analyzed for raw ash, volatile matter, inherent moisture, fixed carbon (by difference), FSI, sulphur and P_2O_5 on an air-dried basis.

11.5 Quality Assurance and Quality Control

GHO instructor lead training modules #1234 to 1243 set out the methods to be used when preparing and analyzing samples in the laboratory following ASTM.

RC sample collection is audited at least once a week during active RC drilling programs, using a pre-set checklist. A digital record of the audit is retained as part of the quality assurance and quality control (QA/QC) documentation.

A selection of raw composite samples is split (minimum of 5% or one-in-20) by the primary laboratory. The originals are assayed as per site requirements. The raw check samples are shipped to a secondary (umpire) laboratory to have raw proximate analysis performed. The primary laboratory that performs the SG miniwash and analysis on the clean product will ship a selection of split clean coal samples (minimum

of 5% or one-in-20) to the secondary laboratory to have clean proximate analysis performed. Check samples assayed as part of the QA/QC program are plotted against the regular samples. The minimum qualities compared include ash and VM. As required, Teck Coal geologists, will meet with the primary laboratory upon completion of the check samples and assessment of the QA/QC results, to review the results of the QA/QC program for exploration coal samples. Corrective actions and any process improvement ideas will be documented and implemented for future drilling programs.

Additional QA/QC checks include:

- The weight of ply samples, as reported from the laboratory, is uploaded into acQuire. The weight of each sample, in combination with the ash of each sample and the drill hole diameter, are used to calculate the theoretical recovery of each interval within acQuire;
- The ash content of intervals is assessed against the geophysical density logs of the RC drill hole. The “Depth Adjustment Tool” is used to view variable adjustment % and guide decisions on compositing. The ash content of raw composites is compared using calculated raw ash content of the composite samples (average of ply samples) versus the laboratory-reported ash of the composite samples, checking for obvious errors.

11.6 Databases

Drill hole collar data, associated seam intercepts, seam quality and deviation survey data are stored in the acQuire database.

Data are loaded directly from logging software, survey companies, or using set importing templates that load the assay data directly from MS Excel worksheets sent by the laboratories. This minimizes any transcription errors.

As data returns from the laboratory, before it is loaded to acQuire, a visual check is done of the qualities to ensure no obvious outliers are present. If there is something unusual, a request is sent to the laboratory for reanalysis. Random visual checks are then completed on screen comparing the laboratory data to the data imported into acQuire. The same steps to select composite samples and laboratory tests are also followed with each drill hole.

The database is regularly backed up, using Teck protocols. All original logs and laboratory reports are stored securely on the network. Historical data were digitally scanned and are also stored on the secure network.

11.7 Sample Security

Special security methods for the shipping and storage of coal samples are not commonly employed, as coal is a relatively low-value bulk commodity.

11.8 Sample Storage

Raw and clean coal samples are kept by the analytical laboratories for a minimum of one year.

11.9 Comments on Section 11

There are no material issues with the sample preparation, security, and analytical procedures known to the QP that could materially impact the accuracy and reliability of the results, and therefore impact the Coal Resource and Coal Reserve estimation.

12.0 DATA VERIFICATION

12.1 Internal Data Verification

The process used to ensure accurate geological data is covered in several training documents at GHO to ensure repeatability between the different geologists compiling the data. The data verification begins with a check of the collar coordinates of each hole against the planned location. Both the planned and actual locations are laid out and recorded with high precision GPS equipment in the field. Any deviation on holes is recoded on tools provided by Century Wireline Geophysical, the contract company generally used to produce the geophysical logs. Deviations are checked visually against surrounding holes later in the process, once the data are in the acQuire database.

Once the locations are verified by the geologist, the logs are picked following set protocols. The rules regarding how a gamma-density log has the seam contacts picked are governed by documentation and training to ensure that all geologists are picking logs in the same manner. Once the coal contacts are picked on each geophysical log, the contacts and collar data are entered into the acQuire® database by the geologist running the exploration program.

The Senior Geologist, Supervisor reviews the coal contact picks for accuracy, both on paper and in the database. The interpretation of any new drill holes entered into the existing model is also double-verified.

Analytical data from the laboratory are evaluated for anomalies and atypical results, generally using geostatistical software. Any data that appear erroneous are reanalyzed by the laboratory to check for accuracy.

An important step in data accuracy and repeatability is that the laboratories and the geologists use the same procedures for each exploration drill hole. There is also a document that sets out all of the steps required to build a geological model, to ensure separate model builds are accurate and comparable.

Once per year, as a minimum, Teck Coal geologists visit the primary laboratory and witness aspects of sample handling and sample analysis.

12.2 External Data Verification

12.2.1 NORWEST (2011)

Norwest Corporation (Norwest) undertook a data review in 2011, using the guidelines set out by the Geological Survey of Canada as the review basis. A total of 24 representative exploration drill hole files, on four random cross-section lines, were selected to evaluate the quality of the geological data generated and the extent to which exploration information was interpreted and recorded from downhole sources. A random selection of geophysically-logged blast hole files was also examined.

Norwest concluded that there were no material issues with the information examined with respect to Geological Survey of Canada guidance.

Much of this material has since been mined out.

12.2.2 WOOD (2018)

Wood Canada Limited (Wood) completed an independent audit of the GHO Coal Resource and Coal Reserve estimation process, and Teck's system of internal controls over that process for corporate governance purposes.

Wood did not find any material issues that could impact the current mine operations, or Coal Resource or Coal Reserve estimation and reporting.

Wood identified a number of minor estimation practice issues and process control issues that Teck Coal could consider implementing; these are under review by GHO staff.

12.3 Comments on Section 12

The checks performed by Teck and GHO staff, including the continuous QA/QC checks conducted by the database administrator and Project geologists on the assay data and geological data are in line with or above industry standards for data verification. These checks have identified no material issues with the data or the Project database.

The 2016 technical report (refer to Section 2.7) included a review of data verification. No material issues with the data or the Project database were identified at that time.

The QP performed the following data verification checks:

- In 2018, the QP led a team of geologists who conducted both the in-pit and ex-pit exploration programs. In that capacity the QP inspected the field activities including drill pad and road construction, drilling operations including coal sampling. The geological team was responsible for sampling, data collection, QA/QC, geological interpretation and modeling. The QP frequently had discussions with the Senior Geology Supervisor, senior production geologist and Coal Quality staff in relation to program execution and results;
- In the QP's capacity as performing Coal Reserves and Coal Resources oversight, the QP meets at least annually with the mine and engineering staff and most recently discussed the following:
  - i) the 2018 exploration results and the 2019 exploration program (in progress);
  - ii) the GHO modeling process including changes in modeling parameters;
  - iii) the status of the action items stemming from the Wood 2018 audit;
  - iv) current year mine plan and life of mine plans. This is followed by a site inspection of the mine operations.

Additionally, the QP reviews, edits and approves the GHO five-year drilling plan, which was most recently undertaken for 2019.

The QP has performed site visits, as outlined in Section 2.4.

As a result of the data verification, the QP concludes that the Project data and database are acceptable for use in Coal Resource and Coal Reserve estimation, and can be used to support mine planning.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

The bituminous coal seams at GHO are blended to produce coal with consistent quality. Blending is accomplished at the breaker by combining coal from several stockpiles. Each stockpile contains coal from different seams with similar quality. Oxidized coal is stockpiled for potential consumption in the dryer. The LOM plan includes the use of coal of selected quality by block as it is released during the production schedule. This determines the overall quality of the products, and to account for changing quality of the coal as the mine advances. Items covered in the LOM include:

- Yearly metallurgical coal release by seam;
- Yearly thermal coal release by seam;
- Annual coal release by pit;
- Metallurgical coal release;
- Metallurgical coal produced for sale;
- Plant yield;
- Fines percent of blend;
- Release and resulting blended component qualities.

13.2 Metallurgical Testwork

In addition to coal quality data collected from the RC samples as discussed in Section 11 as part of new information collected for future pits, carbonization data are also required to support economic extraction.

13.2.1 BULK SAMPLES

Bulk samples are required to obtain washability and carbonization data for coal seams from new mining areas to confirm projections. LDC and LDRF drilling methods are generally used to obtain bulk coal samples. The objective, for either method, is to obtain an unoxidized, representative sample of the coal seam in a manner that best reflects the method by which the seam will be mined; i.e. if the seam is to be mined by open pit truck/shovel methods, all rock partings of 0.9 m vertical thickness or thinner are included in the sample. Thicker partings are excluded. A minimum sample size of 1 t is required for pilot plant washability evaluations.

13.2.2 WASHABILITY TESTS

The collected bulk samples are sent to Gwil for raw coal analysis and Gwil for washability by the float sink method, which is used to define the setpoints for the pilot plant. Some samples are also sent to Hazen for pilot plant washing. The pilot plant circuits are set up to simulate the circuitry used in the GHO process plant. Results from the pilot plant washability can therefore be used to anticipate how the coal seam will be cleaned by the GHO plant.

Other tests generally associated with the pilot plant washability tests include:

- Screen analysis;
- Float sink analysis;
- Froth floatation test;
- Australian wet attrition test;
- Proximate analysis;
- Ultimate analysis;
- Mineral analysis of ash.

13.2.3 CARBONIZATION TESTS

A representative sample (approximately 500 kg) of clean coal from pilot scale washing is sent to a suitable coal carbonization facility (CANMET) for moveable wall coke oven and other related tests. Results from the carbonization tests are used primarily for marketing purposes.

Other tests generally associated with the moveable wall coke oven test include:

- Proximate analysis of feed coal and resultant coke;
- Gieseler fluidity;
- Dilatation and contraction;
- Ash fusion temperature;
- Gross calorific value;
- Coal pulverization sieve analysis;
- Grindability;
- Petrographic analysis;
- Screen analysis of coke;
- ASTM coke tumbler test;
- JIS coke tumbler test;
- Apparent specific gravity of coke;
- Coke reactivity index (CRI) ;
- Coke strength after reaction (CSR).

13.3 Recovery Estimates

Predicted yields are modeled using the plant delivered ash (which is calculated from breaker delivered ash, breaker reject ash and breaker reject volume), plant reject ash and target clean ash using the following formula:

- Plant yield %= (plant reject ash – plant feed ash)/(plant reject ash – plant target clean ash).

This relationship between plant reject ash, plant feed ash and target clean ash is continuously evaluated to ensure a close match to actual plant performance.

Cougar Phase 4–6 has a greater amount of the coal volume in thick seams than does the upper portion of Cougar Phase 7–10. Thin seams generally have lower yields than thick seams due to higher amounts of dilution (more dilution mean a higher breaker delivered ash), which causes a drop in yield subsequent to 2027 as Cougar Phases 4–6 nears completion.

Figure 13-1 shows the projected plant yield over the LOM, and Figure 13-2 shows the clean coal production forecast.

13.4 Blending Considerations

Volatile matter, rank and ash contents are the main items monitored in support of blending.

13.5 Metallurgical Variability

Metallurgical testing frequency and type are representative of individual seams on the basis of rank, coking properties and volume, and are done over a range of locations for each seam to ensure that sufficient sample variability is captured and is available for modeling purposes.

13.6 Deleterious Elements

Since 2015, trace elements that are evaluated for metallurgical coal samples include phosphorus, fluorine, sulphur, chlorine, arsenic, and mercury.

13.7 Comments on Section 13

GHO performs a reconciliation of the modeled coal volume, ash content delivered to the wash plant and predicted yield based on an ash/yield curve. Reconciliations are performed on a quarterly basis and accumulated on an annual basis.

In the QP's opinion, GHO has taken adequate measures to account for the low coal recovery in the geological models and in the estimates of Coal Resources and Coal Reserves.

GHO will continue to pay close attention to reconciliation of actual versus forecast coal tonnages and quality, to ensure that potential coal recovery issues are accounted for in the geological models and Coal Resource and Coal Reserve estimates.

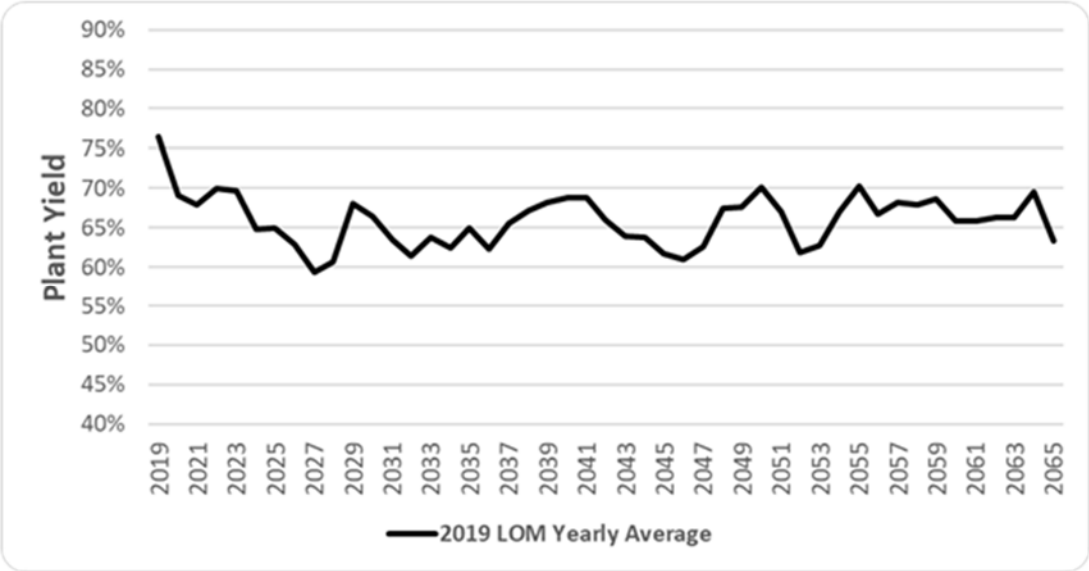

Figure 13-1: LOM Plant Yield Forecast

Note: Figure prepared by Teck, 2020.

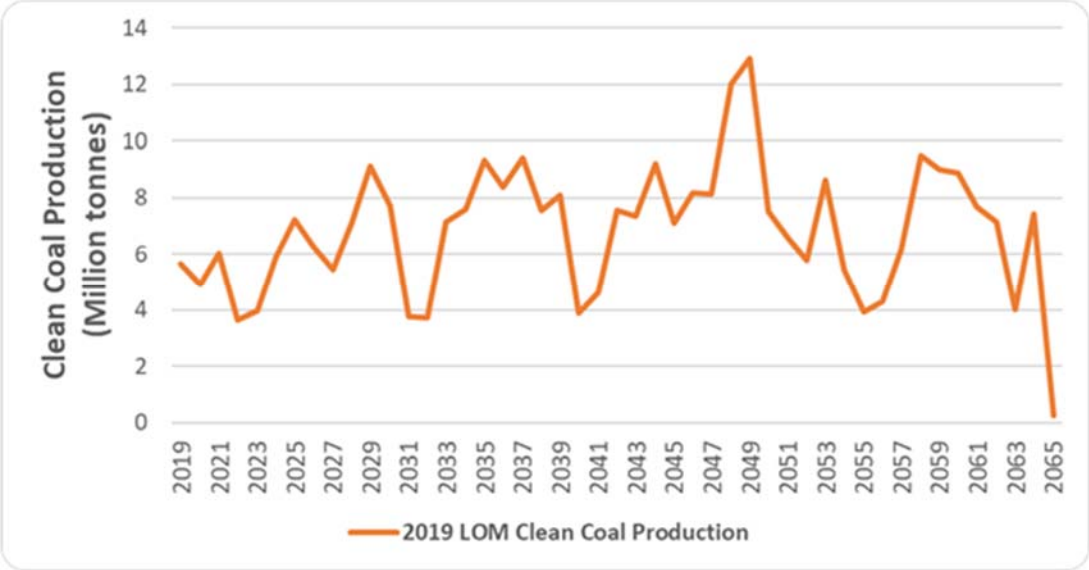

Figure 13-2 Clean Coal Production Forecast

Note: Figure prepared by Teck, 2020.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

Mineral Resources were estimated for the Swift, Cougar and Crow areas. Mineral Resources were converted to Mineral Reserves for the Swift and Cougar areas. Mineral Resources are reported in this section exclusive of those Mineral Resources converted to Mineral Reserves.

Modelling is conducted using the commercially-available MineSight software. The acQuire database close-out date is 11 April, 2019. Estimation is supported by 5,739 drill holes.

The GHO Coal Resource estimates are based primarily on the results of RC drilling samples, and downhole geophysical gamma and density logs. The 3D model is built using the drill intervals of complete seams from the acQuire database. The seam dips and true thicknesses are calculated based on the drill hole data, and the seam polygons are subsequently generated.

14.2 Geological Models

The geological model was constructed using coal depth, thickness and quality data.

14.2.1 THICKNESS

Thickness geological models were prepared for all seams in each estimation area where appropriate.

The resource estimate was based on a minimum true thickness of 1.0 m for a coal composite. This estimate was used to define potentially surface-mineable coal in the individual seams.

GHO geologists evaluate gamma, density and caliper geophysical logs. The coal seam tops and bottoms are measured primarily from the gamma density log and secondarily from the gamma neutron logs. Gamma density log coal seam thicknesses generally closely represent the mineable coal seam thickness in the mine at the location of the drill hole. The geophysical log measurements of the coal depths are accepted as being correct, as is standard in the industry, and are used as the basis for the coal seam thickness in the geological model.

14.2.2 ASH CONTENT

Composite quality results are entered into the acQuire database to provide an indicative value of the in-situ ash content of the coal, as defined by the geophysical logs. The composite sample raw quality results are matched to the geophysical log and corrected to true seam thickness (depth adjusted) in the acQuire database to be interpolated in the 3D block model. The ash content of the coal composite sample is applied to the geophysical log seam thickness and used to model the in-situ coal ash.

14.2.3 TOPOGRAPHY, WASTE AND SEAM MODELS

The 3D block models are based on volumes; the “Topo%” model item stores the volume percentage of the model block existing below topography.

Separate model items list up to three waste types and two coal seams per block, as either metallurgical (met) or oxidized or weathered metallurgical coal (oxide). These items are stored as volumetric proportions of each block.

Additional volumetric items that account for waste above or in front of a coal seam, rehandle material and unconsolidated overburden may also be included; as a quality assurance check, the sum of all the volumetric items in a block must never exceed the Topo% item.

Additional model items for each coal parameter are:

- Seam name;
- Raw ash;
- Raw SG;
- Raw VM
- Run-of-mine (ROM) ash;
- ROM SG;
- Plant yield
- FSI
- Moisture
- Fixed carbon
- Clean sulphur;
- Clean phosphorus.

Where quality information is not amenable to interpolation from drill composites, data are filled in statistically based on geographic location.

14.3 Density Assignment

Computer model block-specific SG values were used for the conversion of volumes of in-place coal to tonnes using the GHO laboratory-validated specific gravity formula (refer to Section 11.2).

14.4 Estimation/Interpolation Methods

The true thicknesses of the seams are calculated using the dip of the coal seams and the length of the coal composite. True thickness is interpolated into the 3D block model using an inverse distance weighting to the second power (ID2) approach. Other interpolation parameters include a circular search method, and a search distance of 2,500 m. This procedure is completed using the “True Thickness Tools” package in MinePlan3D software.

Coal quality data are interpolated into the 3D block model using an inverse distance weighing method. The search distance for each quality criterion is between 500–800 m, and the estimation method power is between 1.5–1.7.

Search ellipse and drill spacing data are provided in Table 14-1. In the QP's opinion, the data spacing is acceptable.

14.5 Block Model Validation

Blocks within the 3D block model are validated by an internal audit report that is generated after every model build. The audit examines the same block from every model build to verify consistency between models, verifies that block calculations are being ran successfully, and compares model-generated values to manually-calculated values.

The 3D block model is also peer reviewed by the Geology and Database QP prior to releasing for mine planning.

14.6 Classification of Coal Resources

The process of classification is completed in the computer model. Model blocks that contain coal are initially assigned a classification below the level of Inferred. Ellipsoid search envelopes with the distance from the centroid along the three axes equal to the distances are used to determine if the block is to be classified as Measured or Indicated.

A minimum of three drill hole intercepts through an individual coal seam must fall within the associated ellipsoid to classify the block. The block is assigned the highest level of assurance that is supported by the data.

Criteria are as summarized in Table 14-2.

14.7 Reasonable Prospects of Eventual Economic Extraction

The depth limit was based on a pit shell with an incremental strip ratio limit of 15:1 m^3/t of raw coal. Input costs to the pit shell, and therefore the break-even stripping ratio cut-off calculation are provided in Table 14-3.

Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles).

Table 14-1: Search Ellipse and Drill Spacing

Zone/Area	Drill Hole Radius (m)	Average Drill Hole Spacing (m)
Cougar Phase 4–6	50–200	53
Cougar Phase 5	50–400	20
Cougar Phase 7	75–300	124
Cougar Phase 8	100–350	134
Cougar Phase 9–10	100–500	278
Crow Ridge	100–400	277

Table 14-2: Confidence Classification Criteria

Category	Maximum Distance from Model Block Centroid to Nearest Seam Composite Along Strike Direction	Maximum Distance from Model Block Centroid to Nearest Composite Along Dip Direction	Minimum Number of Composites Within Search Boundary
Measured	<150	< 200	3
Indicated	150 to 300	200 to 400	3
Inferred	300 to 600	400 to 800	3

Table 14-3: Inputs to Break-Even Stripping Ratio Cut-off

Item	Unit	Values
Selling price	US$/t	140
Waste mining costs	$/bcm	4
Coal mining costs	$/bcm	6.40
Processing cost	$/t	9.90
General and administrative costs	$/t	12
Other (includes operating leases, royalties, distribution, sustaining capital, reclamation)	$/t	50.50
Recommended BESR	bcmw/mtrc	15.0

Notes: bcm = bank cubic metre; bcmw = bank cubic metre waste; mtrc = tonne raw coal.

14.8 Coal Resource Statement

Coal Resources are reported using the 2014 CIM Definition Standards, and are reported exclusive of Coal Reserves. Coal Resources that are not Coal Reserves do not have demonstrated economic viability.

The QP for the estimate is Mrs. Alison Seward, P.Geo., a Teck Coal employee. Coal Resources are tabulated in Table 14-4 and have an effective date of 31 December, 2019.

Table 14-4: Coal Resource Statement

Pit/Area	Coal Type	Measured (raw coal; t x 1,000)	Indicated (raw coal; t x 1,000)	Total Measured and Indicated (raw coal; t x 1,000)	Inferred (raw coal; t x 1,000)
Cougar	Metallurgical	165,004	202,380	367,384	132,211
Crow Ridge	Metallurgical	14,446	25,171	39,617	36,329
Totals	***Metallurgical***	***179,450***	***227,551***	***407,001***	***168,540***

Notes to Accompany Coal Resource Table:

1. The Qualified Person for the resource estimate is Mrs. Alison Seward, P.Geo., a Teck employee.
2. Coal Resources have been classified using the 2014 CIM Definition Standards. Coal Resources are reported exclusive of those Coal Resources that have been modified to Coal Reserves. Coal Resources that are not Coal Reserves do not have demonstrated economic viability. The Coal Resources have an effective date of 31 December, 2019.
3. The Coal Resources are reported using the following assumptions: average selling price of US$140/t, waste mining cost of $4/bcm, coal mining cost of $6.40/bcm; processing cost of $9.90/t, general and administrative cost of $12/t, other costs of $50.50/t, and break-even strip ratio of 15. Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles).
4. All estimates have been rounded. Totals may not sum due to rounding.

14.9 Factors That May Affect the Coal Resource Estimate

Areas of uncertainty that may materially impact the Coal Resource estimates include:

- Changes to long-term coal price assumptions;
- Changes in geological interpretations including the size, shape and distribution of interpreted seams and waste;
- Changes in local interpretations of seam geometry, fault geometry and seam continuity;
- Changes to the input assumptions used to derive the open pit outlines used to constrain the estimate;
- Variations in geotechnical, hydrogeological and mining assumptions;
- Changes to environmental, permitting and social license assumptions.

14.10 Comments on Section 14

The QP is of the opinion that Coal Resources were estimated using industry-accepted practices, and conform to the 2014 CIM Definition Standards. Coal Resources are based on open pit mining assumptions.

The Coal Resources are forward-looking information and actual results may vary.

There are no other environmental, legal, title, taxation, socioeconomic, marketing, political or other relevant factors known to the QP that would materially affect the estimation of Coal Resources that are not discussed in this Report.

There is upside potential for the Project if some or all of the Measured and Indicated Coal Resources can be converted to Coal Reserves, and if some or all of the Inferred Coal Resources can be converted to higher-confidence categories and subsequently to Coal Reserves.

15.0 MINERAL RESERVE ESTIMATES

15.1 Introduction

Coal Reserves are reported for the Cougar Phases 4, 7, 8, 9, and Swift (GHO) areas.

Coal Reserves are based on pit designs and a long-range mine development plan prepared by GHO. Ultimate pit shells were created using long-term product coal pricing and US dollar to Canadian dollar exchange rate estimates. The pits are designed using the same break-even stripping ratio as discussed in Section 14.7.

Waste haulage, waste storage and geotechnical issues were considered in the final pit design. Any Inferred Coal Resources in the pit shell are treated as waste and are not included in the Coal Reserves.

Three non-coal surfaces are incorporated into the model:

- Current topography;
- Mined-out surface;
- Original ground.

These surfaces are used to ensure that previously-mined areas of coal and overburden are properly accounted for. All material between the topography and the mined-out surface is coded as rehandle and reported with a swell factor of 30%. Data for these surfaces come from monthly surveys and periodic flyovers.

Coal Resources are converted to Coal Reserves using the assumptions discussed in the following sub-sections, and the mining methods outlined in Section 16.

15.2 Topography

The current topographic surface is used during the block model generation to identify valid blocks, assigned to existing blocks as Topo%, representing the total volume percentage of any given block remaining. The coal blocks are then rationalized so that the total volume is equal to Topo% times the block volume to ensure no block contains more coal than volumetrically allowed. If there is a discrepancy once waste is added into the block, the waste volume is adjusted until the total material volume matches Topo%. Coal volume is not adjusted.

15.3 Mining Parameters

Coal volumes used for reserves reporting are adjusted for mining factors such as loss and dilution as well as additional losses due to mining in highly-faulted zones. These factors are mostly derived from operating experience at GHO.

Mining parameters for Coal Reserve estimation are as follows:

- Minimum mineable seam thickness: 1.00 m;
- Minimum removable parting thickness: 0.70 m;
- Dilution thickness: 0.1 m;
- Coal loss thickness: 0.2 m;
- Rock dilution ash: 80%;
- Rock dilution SG: 2.30;
- Parting dilution ash: 80%.

Additional seam discounting can be applied around faults or certain thin seams.

SG values for coal are based on empirical formulas, validated over the history of mining at GHO. SG converts modelled coal volumes to weight. To estimate the weight for reference point reporting of reserves, clean coal product, a plant yield factor is used, whereby the yield is a ratio of the weight of coal product exiting the process plant over the weight of coal to enter (or delivered to) the process plant. Yield is based on a delivered ash relationship which is derived from historical plant performance. Clean coal quality information interpolated is as follows:

- Clean moisture [CMOI];
- Clean VM [CVM];
- Clean fixed carbon [CFC];
- Clean sulphur [CSUL];
- Clean FSI [CFSI];
- Clean phosphorus [%P].

With the exception of the clean (product) coal tonnes, the coal tonnage figures, and ash content are estimated in the model on an air-dried moisture content basis. They are not converted to an as-received moisture content basis during the modelling process used to determine in-situ and run-of-mine (ROM or delivered) coal. This procedure allows for the use of the GHO regression factors for project plant yield. Regressions are based on ROM tonnes and ash content, both expressed on an air-dried moisture content basis, and the regression curves account for additional moisture in the clean (product) coal.

With a clean strip ratio for the Coal Reserve of 12.2 bcm waste/clean tonne coal, 3.6 billion bcm of waste must be mined.

Pits are typically designed with the following design factors, unless specific geotechnical criteria are required:

- Wall face angle: 65°.
- Catch bench width: 10 m;
- Inter-ramp angle (single bench): 41.4°;
- Inter-ramp angle (double bench): 51°;

- Waste dump angle: 37°;
- Haul road width: 40 m;
- Bench height: 15 m;
- Haul road grade: 8% maximum.

15.4 Coal Reserve Statement

Coal Reserves are an estimate of the saleable coal product. The reference point is the exit point of the coal product from the processing plant. Coal Reserves are reported using the 2014 CIM Definition Standards.

The QP for the estimate is Mr. Andrew Knight, P.Eng., a Teck employee. Coal Reserves are tabulated in Table 15-1 and have an effective date of 31 December, 2019.

15.5 Factors That May Affect the Coal Reserve Estimate

Areas of uncertainty that may materially impact the Coal Reserve estimates include:

- Changes to long-term coal price assumptions;
- Changes in geological interpretations including the size, shape and distribution of interpreted seams and waste;
- Changes in local interpretations of seam geometry, fault geometry and seam continuity;
- Changes to the input assumptions used to derive the open pit outlines used to constrain the estimate;
- Variations in geotechnical, hydrogeological and mining assumptions;
- Changes to environmental, permitting and social license assumptions.

15.6 Comments on Section 15

The QP is of the opinion that Coal Reserves were estimated using industry-accepted practices, and conform to the 2014 CIM Definition Standards. Coal Reserves are based on open pit mining.

The Coal Reserves are forward-looking information and actual results may vary.

There are no other environmental, legal, title, taxation, socioeconomic, marketing, political or other relevant factors known to the QP that would materially affect the estimation of Coal Reserves that are not discussed in this Report.

Table 15-1: Coal Reserves Statement

Pit/Area	Coal Type	Proven (clean coal; t x 1,000)	Probable (clean coal; t x 1,000)	Total Reserve (clean coal; t x 1,000)	Strip Ratio
Cougar Phase 4	Metallurgical	9,896	7,287	17,186	2.9
Cougar Phase 7	Metallurgical	1,738	27,602	29,340	12.2
Cougar Phase 8	Metallurgical		32,665	32,665	13.1
Cougar Phase 9	Metallurgical		101,764	101,764	12.7
Swift	Metallurgical		114,076	114,076	11.1
Total	***Metallurgical***	***11,634***	***283,394***	***295,028***	***12.2***

Notes to Accompany Coal Reserves Table:

1. The Qualified Person for the reserves estimate is Mr. Andrew Knight, P.Eng., a Teck employee.
2. Coal Reserves have been classified using the 2014 CIM Definition Standards. The Coal Reserves have an effective date of 31 December, 2019.
3. The Coal Reserves are supported reported using the following assumptions: average selling price of US$140/t, waste mining cost of $3–$7/bcm depending on haul distance, coal mining cost of $5–$8/bcm depending on haulage distance; processing cost of $9.90/t, general and administrative cost of $12/t, other costs of $50.50/t, break-even strip ratio of 15, minimum mineable seam thickness of 1.00 m; minimum removable parting thickness of 0.70 m; dilution thickness of 0.1 m; coal loss thickness of 0.2 m; rock dilution ash of 80%; rock dilution specific gravity of 2.30; and parting dilution ash of 80%. Geotechnical assumptions use pit slope angles that range from 40–51º (overall highwall angles). More complex criteria are used for footwall slopes that are structure specific. Yield is a function of feed ash and product and is therefore seam and product dependent.
4. All estimates have been rounded. Totals may not sum due to rounding.

16.0 MINING METHODS

16.1 Introduction

The mining operations use conventional truck-and-shovel methods. As a result of delivery requirements and varying coal seam qualities it is necessary to have multiple coal seams exposed at any time.

GHO currently produces coal from two active pit phases (Cougar Phases 4 and 7) using open-pit coal mining methods, with primary waste stripping and coal mining completed by shovels and rear dump haul trucks. An additional three phases (Cougar Phases 8, and 9, and Swift (GHO)) are planned.

16.2 Geotechnical Considerations

Geotechnical exploration programs are conducted before development and during operation. These programs consist of oriented core drilling, to understand physical rock mass characteristics, together with both optical and acoustic televiewer studies to confirm structure orientations. Hydrogeological testing is also completed to estimate pore pressures within the rock mass and determine its effect on pit design stability.

The Cougar Phases 4–6 pit designs typically use bench heights of 15 m with a 65º face angle. The wall is typically double-benched, with 10 m wide safety benches, resulting in an overall wall angle of 51º. Where walls come into contact with rehandle, a 10 m berm is left, and the rehandle is sloped up at 37º. Spoils are built with a swell factor of 1.3, and inter-bench angles that vary from 20–37º, depending on configuration and reclamation requirements.

For the Cougar Phases 7–9 pit designs, the selected design shell was a 40º overall highwall angle, with a 65º inter-bench angle. The choice of angle was based upon the height of the highwall and geotechnical guidance for rock mass failures of highwalls at these heights.

Pit walls and spoils are monitored with a combination of prisms, GPS units, radar, wireline monitors, and piezometers. These systems are linked to near real time data collection and analysis software that has the capability to sound an alarm when thresholds have been exceeded.

16.3 Hydrological and Hydrogeological Considerations

Teck actively manages water within the pits throughout the year by dewatering with the use of surface and deep-well pumps via pipelines to water management infrastructure (refer to discussion in Section 18.6).

The Pit Water Management Plan outlines how pumping activities are managed to minimize impacts to water quality and quantity while maintaining proper function associated water infrastructure. The purpose of the Pit Water Management Plan is to satisfy regulatory requirements under *Environmental Management Act* (EMA) Permits 6248 and 107517, *Water Sustainability Act* Approvals A4-7511 and A4-7132, and the Health, Safety and Reclamation Code.

Teck has invested in a sustainable water supply strategy and constructed a network of water conveyance pipelines from the pits that will supply water to all the industrial processes on site while reducing clean ground water consumption and the quantity of mine contact water discharged off site. The operations first priority is to look for opportunities to recycle water within the operations with excess water discharging to the receiving environment.

A portion of the pumped water is re-used for purposes such as vehicle washing, fire suppression, dust suppression and coal washing in the TSF (refer to discussion in Section 18.10).

The pumps and pipelines are often temporary, and are relocated depending on the pit sequence configuration necessary to maintain mining operations. For this reason, water sources are typically referred to as entire pits, rather than point sources.

The discharge strategy outlined below will be used when pit water is to be released to the receiving environment. It consists of the following four steps:

1. Initially characterizing the quality of the water to be discharged;
2. Establishing that the water scheduled for discharge is not acutely toxic to aquatic life;
3. Determining maximum discharge rates using a pre-set Excel tool;
4. Monitoring during discharge to:
    a. Continue to characterize the quality of the water being discharged;
    b. Identify what, if any, change to water quality is occurring in the receiving environment and if detectable changes are consistent with expectations For the purposes of this Pit Water Management Plan, initial discharge is defined as:
        i. The first time in a given calendar year pit water is discharged to the receiving environment from the source in question; or
        ii. The first-time pit water is discharged to the receiving environment from the source in question in more than 30 days.

Steps 1 and 2 are one-time activities that are undertaken prior to the initial discharge of pit water to the receiving environment. Steps 3 and 4 are intended to be iterative, with information collected from on-going monitoring influencing the rates of discharge over time.

16.4 Mine Design and Mining Sequence

The Lerch-Grossman (LG) analysis of the block model provides a starting point for the pit design process. Using this method, a series of pit shells are produced, and an optimal pit shell is determined for the ultimate pit design that forms the basis of the LOM plan. Areas where the pit design differs from the initial shell can be due to geotechnical constraints or where mining outside the pit shell limits is required to provide access to the pits. Any additional waste is included in the overall strip ratio and economics. The review of the design indicates that the phased pit designs align well to the optimum shell generated and neither the updates to the geology or economics significantly alter the design.

Electric cable-shovels are utilized to load overburden and interburden waste into a mixed fleet of 290 t and 218 t capacity end dump trucks, exposing the steeply-dipping coal seams in a series of benches.

Before loading, the waste is subject to drilling and blasting, which fragments the rock so that it can be dug by the shovels. Mine waste is backfilled into the advancing mining pit whenever practical and to external spoils as required. The coal is loaded by front-end loaders, which receive assistance from bulldozers that push the coal into piles on the bench. The coal is delivered to a stockpile by the breaker by large haul trucks, where it is fed to a breaker then transported by conveyor to the processing plant.

The completed pits and spoils are reclaimed in a manner that fulfills requirements set out in the granted mining permits.

16.5 Spoils

Teck uses the following terminology for spoils:

- In pit spoils is where waste rock is placed in a mined-out pit. They are also referred to as “backfill spoils” because the waste rock is used to fill in the previously mined out area;
- Ex-Pit spoils are spoils where waste rock is placed on original ground.

In-pit spoils are designed at 32º, leaving approximately 10 m of catchment every 30 m when above roads.

Ex-pit spoils are typically designed in lifts using an overall slope angle of 20–26º. The locations of the current ex-pit spoils are included in Section 18.

16.6 Production Plan

The Coal Reserves support a mine life to 2065, which includes significant raw coal tonnes from GHO pits being processed at Fording River Operations when it can improve operational performance (see also discussion in Section 21.3).

16.7 Blasting and Explosives

Drilling is currently done with electric drills that use 311 mm diameter bits. Holes are drilled vertically. Normally, drilling is designed to blast one bench (15 m) at a time.

Drilling is completed with offset patterns from bench to bench so that there is no potential to drill into previous bench bootlegs that may exist. Coal seam locations are determined as the machine drills each hole. This information is used to design explosive charges for each hole.

Hole spacing and burden dimensions are designed to provide the necessary explosive energy to break the rock sufficiently so that it can be dug productively and at the same time minimize coal seam disturbance.

A pattern consists of a block of multiple holes. Once a pattern is drilled and the holes have been primed and loaded with explosive it is tied in and shot. The tie-in incorporates delays that provide progressive relief for the rock to break into as the rows of holes detonate. This provides better fragmentation, waste pile looseness, reduced coal seam disturbance and reduced fly rock.

Explosives are ammonium-nitrate based. Anfo products are used in dry holes and Heavy Anfo products consisting of blends of Anfo and emulsion are loaded where water resistance is needed.

Blasting operations are carefully planned to provide blasted waste for the mining fleet in a timely fashion.

16.8 Production Monitoring

The four main methods of sampling coal seams and pushed coal piles in the pit and breaker pocket include:

- Grab sampling consists of taking shovel scoops of the material to be sampled, and placing it in a sample bag. Scoops are taken at the top, middle and bottom of the pile that is being sampled to eliminate any bias related to grain size;
- Trench or channel sampling. The seam is typically marked out using a GPS and roughly traced with a dozer. A raw sample is taken for percent light transmittance to ensure there is no seam oxidation. A dozer cleans off the seam, and a trench is excavated along a laid-out tape measure that is runs from hanging wall to footwall and is perpendicular to strike. The trench is divided into equal size units, and an equivalent amount of coal is sampled from each unit thickness. The surveyed location of the hanging wall and footwall are entered into the geological database;
- Ash probe sampling is performed to obtain an ash content, which is used to determine stockpile location, assess dilution, and to verify modeled ash assumptions;
- Blasthole cuttings sampling requires a sample to be taken through the entire pile thickness.

16.9 Mining Equipment

The equipment fleet is summarized in Table 16-1.

At year-end 2019, a third P&H 4100 XPC cable shovel was in the process of assembly, but was not operational. This shovel is included in the equipment fleet count.

Table 16-1: Equipment Fleet

Equipment Type	Units
P&H 4100XPB electric cable shovel	1
P&H 4100XPC electric cable shovels	3
P&H 2800XPB electric cable shovel	1
LeTourneau L1850 front end loaders	2
Caterpillar 994 front end loaders	2
Komatsu WA 1200-3 front end loader	1
Bucyrus Erie 49R production drills	3
Caterpillar MD6640 production drill	1
Haulpak 830E waste/coal rear dump haul truck	4
Haulpak 930E rear dump haul truck	29
Bulldozers	12
Graders	5
Backhoes	4
Scrapers	1
Water trucks	4

17.0 RECOVERY METHODS

17.1 Introduction

The process plant uses conventional equipment and a conventional process. The flowsheet design was based on testwork results, study designs and industry standard practices.

The basic operation of a coal processing plant is separation by gravity for the coarser particles . Based on the difference in specific gravity of coal and rock, the coal can be separated to a desired specification. To assist gravity separation, mechanical means are also used. At GHO, this is accomplished through vibrating screens, cyclones, and spirals. Flotation is used to recover the fine coal particles. Each technique contributes to the recovery of clean coal from the raw coal feed.

17.2 Plant Flowsheet

The plant flowsheet is provided in Figure 17-1.

17.3 Plant Design

Plant specifications and the plant equipment list is provided in Table 17-1.

17.3.1 BREAKER

Coal is fed to the breaker where rock that >2” is separated from the coal and any coal that is >2” in size is broken and passed through perforated breaker plates. Broken coal is fed to the raw coal silos. Rejects from the breaker are piled and subsequently hauled to the coarse coal reject spoils using loaders and trucks.

17.3.2 WASH PLANT

GHO has two raw coal silos which can hold up to 1,800 t each. The silos are used to store the raw coal before it is processed in the plant.

Deslime screens are large vibrating screens used to split the coal feed into different sizes. Material >1.0 mm reports to the coarse circuit. Material <1.0 mm reports to the fines circuit.

Heavy media cyclones are used to separate coarse rock from coarse coal. Coarse coal goes out the top, while coarse rock goes out of the underflow. Vibrating screens used for cleaning and dewatering and excitors are used to “throw” the material across the deck.

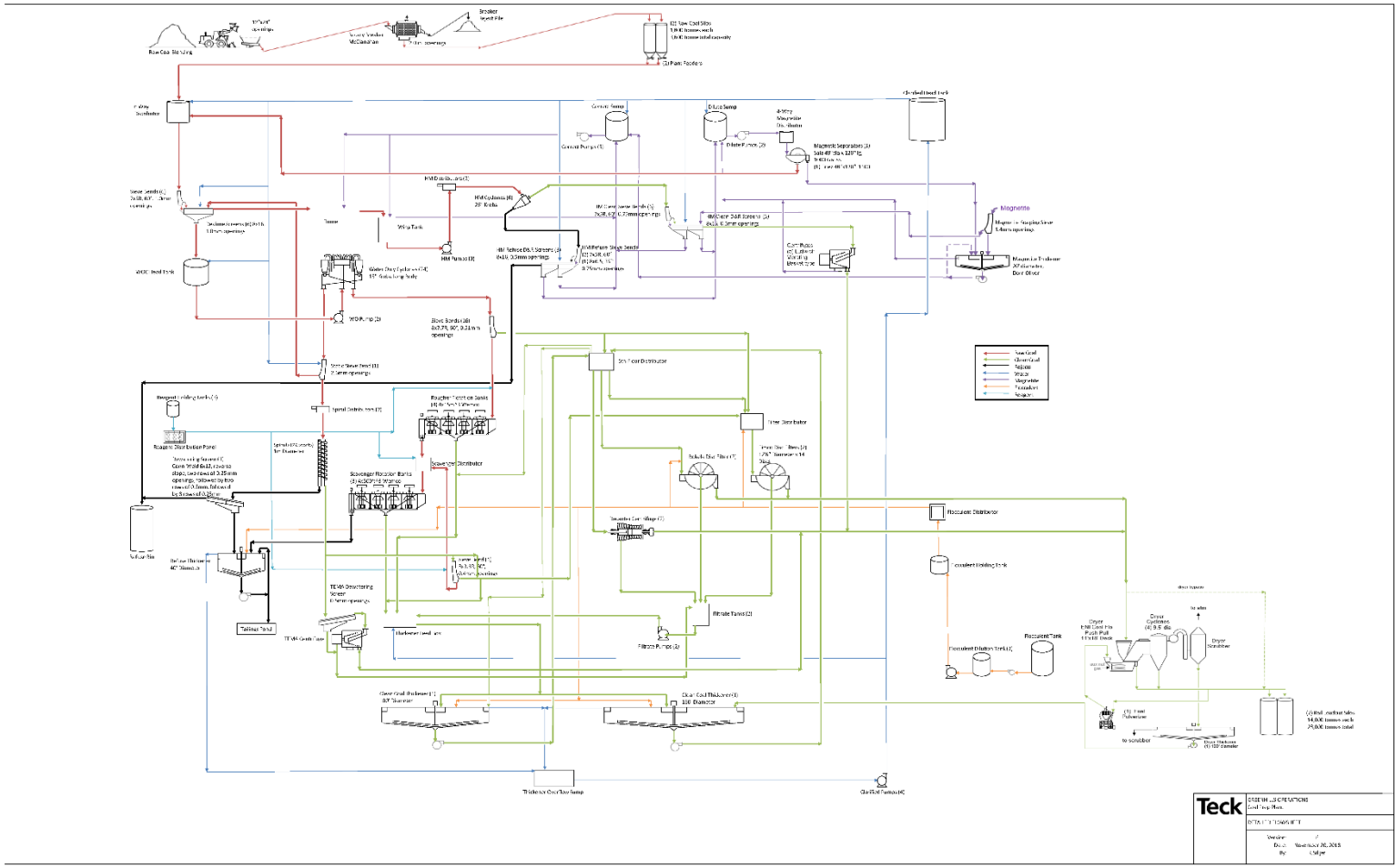

Figure 17-1: Process Flowsheet

Table 17-1: Plant Equipment List

Component	Design Capacity	GHO Feed (avg)
Deslime sieves	N/A	1,000 tph
	6,510 gpm (1,478 m^3/h)	862 m^3/h
Deslime screens	720 tph (15 tph/ft of width)	750 tph
HMCs	828 tph raw	530 tph
	2,586 m^3/hr volume	2,586 m^3/hr
Clean coal sieves	5,250 gpm (1,192 m^3/h)	1,724 m^3/h
Clean coal screens	480 tph	421 tph
Magnetic separators	13% solids = 144 gpm/ft = 5,760 gpm = 1,308 m^3/h	1,295 m^3/h (5,700 gpm)
	20% solids = 76 gpm/ft = 3,040 gpm = 690 m^3/h	
Centrifuges	1,500 tph	421 tph
Refuse sieves	2,625 gpm (596 m^3/h)	862 m^3/h
Refuse screens	288 tph	109 tph
Mag scalping sieve	210 gpm/ft * 6 ft = 1,260 gpm = 286 m^3/h	45.6 m^3/h (201 gpm)
Mag thickener (20')	616 m^3/h	20 m^3/h underflow (88 gpm), 25 tph solids
WOC tonnage	Min = 288 tph Max = 600 tph	470 tph
WOC flow	Min = 2,780 m^3/h Max = 3,924 m^3/h	2,300 m^3/h
Spiral feed static sieve	1,500 gpm (250 gpm/ft width) = 341 m^3/h	230 m^3/h
Spirals	2–3 tph/start (144–216 tph)	188 tph
	512–768 m^3/h	301 m^3/h
High frequency screen	60 tph, min 35% solids	88 tph
Refuse thickener (Delkor)	38.6 tph	144 tph
	15 mins residence time.	2 h residence time
Spiral clean static sieve	50 gpm/ft = 400 gpm = 91 m^3/h	200 m^3/h
Fine coal sieves	14,080 (3,200 m^3/h)	2,070m^3/h
Roughers	2,304 m^3/h	1,760 m^3/h
Scavengers	1,632 m^3/h	1,200 m^3/h
100' thickener	336 tph	116 tph
	4,634 m^3/h	461 m^3/h
160' thickener	480 tph	325 tph
	11,852 m^3/h	1,289 m^3/h

Component	Design Capacity	GHO Feed (avg)
Decanters	72–91tph	92 tph
	205 m^3/h each	187 m^3/h
Disk filters (Eimco)	132 tph dry	157 tph feed, 116.5 tph wet recovered (91 tph dry)
	312 m^3/h	320 m^3/h
Reagent distribution kerosene	15 Lpm	672 mL/min
Reagent distribution MIBC	15 Lpm	107 mL/min
Flocculant system	378 Lpm	63 Lpm
TEMA	35–60 tph	100 tph

Note: GPM = gallons per minute; tph = tonnes per hour; Lpm = litres per minute; h = hour; MIBC = methyl isobutyl cabinol; TEMA = scroll centrifuge.

Magnetite is used to control fluid density. Magnetite has a solid density of 5.1 but the process dilutes it with water to an SG range of 1.40–1.54. The higher density water/magnetite slurry helps more material "float", meaning more ash (more rock), but also more coal, will be recovered in the product. Magnetite is recovered through washing at the reject and clean coal screens, and then passed over magnetic separators.

Flotation cells are used to separate the fine coal. Fine material from the cyclones is sent to the first stage or rougher flotation cells. Kerosene and methyl isobutyl cabinol (MIBC) are used to form bubbles when agitated, and the coal sticks to the bubbles and floats to the top. The rock sinks and goes out the underflow. The resulting concentrate goes to the clean coal thickener, and underflow goes to the scavenger flotation cells.

The scavenger cells are used as a second opportunity to float any coal that may have not floated in the rougher. The resulting concentrate goes to clean coal thickener, and underflow goes to the refuse thickener. The thickeners rakes move thickened material to the disc filters, which use vacuum pressure to extract the water out of the coal, making a filter cake.

17.3.3 DRYER

Discharge from disk filters (filter cake), fine coal centrifuges and basket centrifuges are combined to feed the dryer. The dryer is fueled with natural gas or thermal coal that is burned, and the heat produced evaporates the moisture from the coal. The dryer takes coal from the plant at about 16% moisture and dries it to about 8% moisture.

17.3.4 STORAGE AND RAIL LOADOUT

GHO has two clean coal silos which can hold up to 14,000 t each, and are used to store the clean coal before it is railed. GHO loads unit trains, which take up to 14,000 t per train. The trains, operated by CPR,

are gravity loaded from chutes coming off the bottom of the clean coal silos. During loading the cars are sprayed with a flocculent to prevent dusting during transportation.

17.4 Yields

Yield forecasts were included in Section 13.3.

17.5 Energy, Water, and Process Materials Requirements

17.5.1 POWER

The plant power consumption averages 80,000,000 kWh/year.

17.5.2 WATER

The average water usage by the plant is 1.65 Mm^3, which is drawn from a combination of mine contact water and well water. The split of well water versus mine contact water usage varies by year.

17.5.3 REAGENTS

The main reagents used in the plant include kerosene, MIBC, and flocculant.

18.0 PROJECT INFRASTRUCTURE

18.1 Introduction

Surface infrastructure to support operations is in place, and includes:

- Open pit areas;
- Processing facilities: coal preparation plant including wash and drying facilities, together with management and engineering offices, change house, maintenance shops, warehouse, assay laboratory facilities;
- Mine facilities: management and engineering offices, change house, heavy and light vehicle workshops, wash bay, warehouse, explosives magazine, crusher, mine access gate house, return water pump house;
- Administration buildings: facilities for overall site management, safety inductions, and general and administrative functions;
- Raw coal stockpiles;
- Breaker;
- Waste dumps;
- Haul roads;
- Raw coal and clean coal conveyor system;
- Rail load-out facilities;
- Water management facilities: stormwater and sediment ponds, water storage tanks, water diversions, culverts;
- Tailings storage and coarse coal refuse storage facilities;
- Landfill facility;
- Sewage treatment facility;
- Electrical power system;
- Fuel storage facilities;
- Explosive raw product storage and explosive bulk truck maintenance facility.

A layout plan showing the facilities constructed to support mining operations is provided in Figure 18-1.

Some new haul roads, spoil piles and environmental control systems will be required for future developments and are included in the mine planning and Project economics. These will require permitting.

18.2 Road and Logistics

18.2.1 ROAD

The mining operations are accessed via an all-weather highway, Highway 43, through the town of Elkford. Goods are delivered primarily by transport trucks and occasionally by rail.

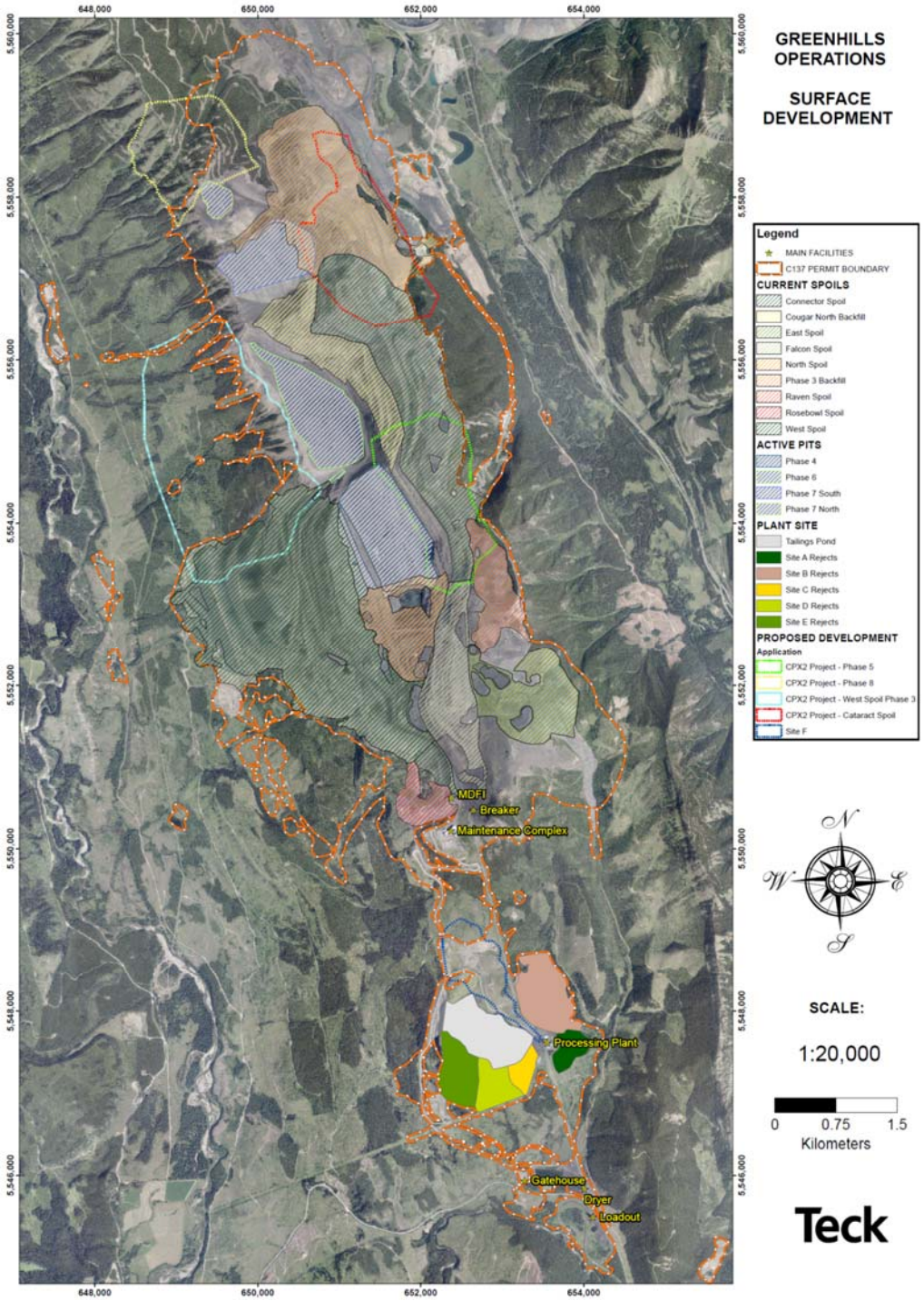

Figure 18-1: Infrastructure Layout Plan

Note: Figure prepared by Teck, 2020.

18.2.2 RAIL

Coal is transported in unit trains from the site loadout facilities by either CPR or CNR to terminals in Vancouver or Prince Rupert. The CPR and CNR own their own lines and have line sharing agreements in place to expedite traffic in certain areas.

Additional information on the load-out is provided in Section 17.4.3.

18.3 Stockpiles

Raw coal is stockpiled in several areas of the mine. The stockpiles are placed according to available space, with preferred locations near the breaker or active pits.

Clean coal is stockpiled near the plant drier, and the rail.

Teck also maintains about five major salvaged soil piles for future reclamation purposes.

18.4 Spoil Piles

Historically, waste rock has been deposited in spoil piles in three main areas at the GHO site, located to the east, west and north of the Cougar Pits. Waste rock has also been backfilled in previously-mined areas.

The spoil pile design assumptions are provided in Section 16.5.

18.5 Coarse Coal Refuse and Tailings

As a result of coal processing at the plant, including washing, two waste types are generated, coarse coal refuse (CCR) and tailings.

The CCR material consists of rocky shales, siltstones, mudstones and sandstones, and some coal. CCR is loaded from a bin onto haul trucks and hauled to one of two CCR storage areas (Sites B and CDE in Figure 18-1). These spoil areas will reach permitted capacity at the end of 2022.

An additional dry stack storage facility is planned at Site F, situated immediately north of the TSF, and adjacent to an existing CCR storage area. Geotechnical investigations and conceptual designs have been prepared for Site F.

The second coal processing waste type from the plant is a finer waste material which includes silt, clay particles, and coal. The finer waste material is termed “tailings”. Tailings are pumped as slurry via a pipeline to the TSF.

18.6 Tailings Storage Facility

The TSF consists of a tailing pond which is retained by two dams: the Main Tailings Dam, located at the southeast end; and the West Tailings Dam, located on the west side of the pond. The pond is impounded by topographic controls on all other sides.

The TSF has sufficient storage capacity to hold the design flood (72-hour duration event, 1/3 between one-in-1,000 year flood and the probable maximum flood), and can store approximately 1.1 Mm^3 of water while maintaining the minimum freeboard of 1.3 m (as per CDA 2013), and approximately 1.7 Mm^3 of water to the minimum crest.

The tailings dams will undergo raises during mining operations; however, these alone will not be sufficient to meet the LOM tailings storage requirements.

Teck is in the process of updating a tailings strategy that considers alternative tailings management options that will satisfy life of mine requirements. Teck anticipates that fine tailings dewatering is possible and that large volumes of fine refuse could therefore be combined with CCR in the existing storage site and Site F. By disposing of fine refuse with the CCR rather than with tailings, the overall storage capacity of the TSF may be extended to the current end of mine life with appropriate dam raises.

Fine tailings dewatering is currently being used at Teck's Line Creek and Coal Mountain Operations. If fine tailings dewatering is not feasible at GHO, then a dredge and pump system (such as used at Teck's Fording River Operations) could be used to transfer tailings from the impoundment to a previously-mined pit for disposal.

18.7 Water Management

Any water on or near the mine site is categorized using three definitions based on water-land contact scenarios:

- Non-contact water: Runoff and groundwater from land not impacted by mining activities, typically up gradient of mining activities;
- Mine-influenced water: Contact surface or ground water from disturbed mine property flowing as surface water runoff or emanating from rock spoils;
- Pit water: Surface and groundwater contained within open and saturated back-filled pits.

Teck's approach to managing water includes:

- Capturing and diverting mine contact water to authorized discharges and drainages, while controlling erosion;
- Prioritizing the use of mine contact water for industrial purposes on site;
- Keeping non-contact water away from mine contact.

Water management at GHO is an essential component of operational planning which ensures availability of water, ample capacity and structural integrity within the water management infrastructure in order to handle anticipated flows and volumes. Drainage structures onsite are managed as per GHO's Mine Water Management Plan. The Mine Water Management Plan is part of Teck's Sustainability Goals and is intended to be an overarching document guiding water management at GHO. It involves a comprehensive approach to water management allowing information to be centralized and facilitating staff from various departments to collaborate in its implementation.

The preferred water strategy for operations is summarized in Table 18-1. Water management structures include dam structures, catch basins, sediment and settling ponds, conveyance ditches, and the TSF. The catch basins, ponds, and ditches are used to control the effects of sediment-laden water prior to discharge catchments that feed the Elk River. Dewatering of the active pits is required to maintain safe and productive mining, and pit dewatering will be required throughout the remainder of pit life.

GHO manages water effluent in accordance with EMA Permit 6248 (containing authorized works for water management), EMA Permit 107517 and the *Mines Act*. In general, the water management network at GHO intercepts and conveys contact water via ditches or pipes to sumps or sediment ponds. Solids are settled in the ponds and the water is then discharged to the receiving environment. Teck currently has eight sediment pond systems, which are designed to prevent fine particles transported by site runoff from entering natural watercourses.

Pit water is managed through pumping based on the approved Pit Water Management Plan approved under Section 2.12 of EMA Permit 6248.

Teck has a number of management plans in place in support of water management, such as those that address erosion and sediment control, nitrates, metals leaching, acid rock drainage, freshet preparedness, and emergency response plans, amongst others.

Teck is evaluating or implementing a number of knowledge-building projects including monitoring programs to build long-term records of system behavior, investigations on geochemical control mechanisms such as gypsum sequestration of selenium, geochemical monitoring, and the use of antiscalant technology for calcite management.

Table 18-1: Water Management Strategy

Land Use Type	Water Type Classification	Preferred Water Management Strategy for Operations
Land not affected by mining activities	Non-contact water	Divert runoff around active mining areas to watercourses via channels, pipes and/or non-contact water sediment ponds Continue monitoring
Cleared land, light-duty roads	Mine-influenced water	Capture and convey runoff to drainages associated water management infrastructures such as, sediment ponds or promote infiltration with sumps and ditches via overland flow routes
Haul roads and operational areas	Mine-influenced water	Capture and convey runoff to: Drainages associated with sediment ponds Promote infiltration with sumps and ditches via overland flow routes. Active or dormant pits for dewatering or subsequent use if authorized
Pits	Pit water	Pump water to: Sediment ponds prior to discharge to the receiving environment TSF for use in the coal washing process if authorized Site process tanks for industrial use if authorized Dust suppression equipment if authorized
Spoil tops	Mine-influenced water	Avoid runoff flowing down spoil faces. Capture and convey runoff to: Drainages associated with sediment ponds Promote infiltration with sumps and ditches Active or dormant pits for dewatering or subsequent use if authorized
Water retention structures	Mine-influenced water	Managed for geotechnical stability, freeboard maintenance, operational water requirements and water quality by channels, pumping, piping, etc.

18.8 Camps and Accommodation

Mining personnel are recruited from across Canada with most living in the Elk Valley, within the towns of Elkford, Sparwood, or Fernie. There is no on-site accommodation, and personnel drive-in-drive-out to the operations.

18.9 Power and Electrical

Power to the site is supplied by BC Hydro via the BC & Alberta link, known as the Kan-Elk line. There is a single 138 kV power line into the GHO property, which is a spur line of a main hydroelectric line.

The major power consumer is the process plant, which averages 80,000,000 kWh/year.

18.10 Water Supply

Water usage is licenced through under the *Water Sustainability Act*, and no changes can occur without considering the existing authorizations.

Teck currently holds eight authorized water licences for water use (consumptive) or water diversion (non-consumptive):

- Water for consumptive use (e.g. coal washing, vehicle washing, dust suppression, fire suppression and pit dewatering) is supplied to site by either a network of interconnected groundwater wells or pit water;
- Non-consumptive water licenses cover ponds that divert the total flow of a creek for the purpose of solids settling. Water is currently being pumped from Lower Greenhills Creek into a calcite treatment module where there is an anti-scalant addition that inhibits the formation of calcite on the creek bed downstream of the module.

Water supply for the mine is provided by four main deep groundwater wells located in the Fording River Valley. In addition, there are two backup wells located in the Greenhills Creek watershed area. All of these wells are situated within the Project area.

The process plant recycles approximately 53% of the water used in the coal cleaning process. Make-up water is obtained from the wells.

19.0 MARKET STUDIES AND CONTRACTS

19.1 Market Studies

No market studies are relevant as the operations have sales contracts in place. All sales contracts are entered into by Teck Coal, as nominee and agent for Teck Coal Partnership.

Markets for the metallurgical coal products include Asia, Europe, North and South American customers.

GHO produces metallurgical coal for the global steel industry. These are classified as either HCC or SHCC (refer to Section 7.2.3).

19.2 Commodity Price Projections

GHO production is blended with the products produced from other Teck operations then sold by Teck.

Quarterly-priced sales represent approximately 40% of coal sales, with the sales balance priced at levels reflecting market conditions when sales are concluded.

Sales distribution of GHO products reflects overall geographic reach of Teck's diversified steel-making coal customers.

19.3 Contracts

Major site contracts include fuel supply, explosives and accessories, and exploration drilling and maintenance support as needed. Contracts are in place with both CPR and CNR for coal transport to the Westshore Terminals, Ridley terminal and the Neptune Bulk Terminals. Contracts are also in place with all terminal facilities to offload, stockpile, blend GHO coal to Teck's product specifications and, load bulk cargo vessels. Teck holds a 46% interest in Neptune Bulk Terminals. Customers arrange for ocean going bulk carriers to transport the coal from the terminals to their facilities for end use.

Contracts are negotiated and renewed as needed. Contract terms are within industry norms, and typical of similar contracts in BC that Teck is familiar with.

19.4 Comment on Section 19

The QP has reviewed commodity pricing assumptions, marketing assumptions and the current major contract areas, and considers the information acceptable for use in estimating Coal Reserves and in the economic analysis that supports the Coal Reserves.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Introduction

Baseline studies were completed in support of initial operations. Mining operations commenced in 1983.

20.2 Environmental Considerations

The Greenhills Operations Environmental Management System (EMS) is certified under the ISO 14001 standard and is consistent with other Teck operations in which the pursuit of sustainability guides the approach to business. Teck is committed to environmental management best practices and to achieve continual improvement in the company's environmental performance. Through this policy Teck committed to:

- Elk Valley Water Quality Plan;
- Biodiversity Management Plan;
- Fugitive Dust Control Management Plan;
- Cast Over Management Plan;
- Mine Water Management Plan;
- Pit Dewatering Management Plan;
- Erosion and Sediment Control Management Plan;
- Invasive Plant Management Plan;
- Migratory Bird Management Plan;
- Grizzly Bear Denning Management Plan;
- Soil Salvage Management Plan;
- Metal Leaching and Acid Rock Drainage Management Plan;
- Flocculent Management Plan;
- Nitrogen Management Plan;
- Site Specific Groundwater Monitoring Plan;
- Seep Monitoring Plan;
- Tributary Management Plan.

20.2.1 ELK VALLEY WATER QUALITY PLAN

In April 2013, the BC Minister of Environment required that Teck develop an area-based water quality management plan. Input was sought through three phases of consultation with the public, governments, First Nations and other stakeholders in the region.

The Elk Valley Water Quality Plan is based on extensive research and study into aquatic health in the Valley, and consideration of current and future mining activity. Plan objectives (Teck, 2015) are:

- Implementing water quality mitigation measures (e.g., treatment facilities and diversions)
- Continuing research and development to identify additional sustainable options to manage water quality now and in the future;
- Ongoing monitoring to assess water quality and aquatic health during implementation of the Plan, to confirm that the objectives of the Plan are being met, ensure aquatic and human health are protected;
- Adaptively managing implementation of the Plan to ensure that new data and information is continually assessed and considered, and actions taken when necessary to meet objectives;
- Providing information to the public and other stakeholders on the results of the work undertaken, and continuing to consult and gather feedback throughout the Plan's implementation.

Teck continues to implement the Elk Valley Water Quality Plan to address increasing selenium and nitrate water concentrations, assess and track levels of sulphate and cadmium, while at the same time allowing for continued sustainable mining within the watershed. The Elk Valley Water Quality Plan also lays out a strategy to address calcite formation associated with historical and current mining activities.

Permit 107517 under the Environmental Management Act takes an area-based approach to authorizing and managing water quality constituents of interest originating from current and historical mining activities in the Elk Valley. To do so requires an extensive surface water monitoring program that includes authorized discharges, receiving environment and other sampling sites, eight authorized discharge Compliance Points, and seven Order Stations for which Site Performance Objectives have been established. These permitted sampling locations are used to evaluate compliance, and overall effectiveness of the Elk Valley Water Quality Plan. An annual report is prepared summarizing monitoring and analysis associated with Permit 107517.

As a component of the Elk Valley Water Quality Plan, Teck operates an active water treatment facility at West Line Creek that includes an advanced oxidation potential system. The system is operating as expected and has been successful in removing selenium and nitrate and improving the effluent quality by converting reduced selenium species to the selenite form prior to discharge into the receiving environment.

A Regional Groundwater Monitoring Program is focused on monitoring groundwater conditions in the upper part of the Elk Valley watershed. The program collates information on potential impacts of Teck's mining operations on groundwater and the interactions between groundwater, surface water, and aquatic environments.

A Regional Aquatic Effects Monitoring Program is a valley-wide program that looks at the biological effects of water quality on aquatic organisms, specifically benthic invertebrates and fish. Field sampling occurs every year, but the results are analyzed and reported on every three years. Teck carries out four local aquatic effects monitoring programs in specific mining areas. The local aquatic effects monitoring program at Greenhills Operations started in 2017.

In February 2018, the Government of Canada proposed new regulations under the *Fisheries Act* relating to coal mining effluent. While these regulations are still in development, they could impose significant costs and operating limitations on Teck's steelmaking coal operations. In the absence of these new regulations, coal mining activities cannot be conducted in compliance with the *Fisheries Act* and Teck may face significant liability as a result. Federal regulatory issues may create additional difficulties in obtaining permits for the Elk Valley operations, whether or not charges are eventually laid, or Teck is successful in defending any charges.

During the third quarter of 2018, Teck Coal received notice from Canadian federal prosecutors of potential charges under the *Fisheries Act* in connection with discharges of selenium and calcite from steelmaking coal mines in the Elk Valley. Since 2014, compliance limits and site performance objectives for selenium and other constituents, as well as requirements to address calcite, in surface water throughout the Elk Valley and in the Koocanusa Reservoir have been established under a regional permit issued by the Provincial government, which references the Plan. If Federal charges are laid, potential penalties may include fines as well as orders with respect to operational matters. Teck expects that discussions with respect to the draft charges will continue at least into 2020.

Fish census data obtained in late 2019 showed unexpected and substantial reductions in populations of Westslope Cutthroat trout in certain mine-affected waters in the Elk Valley. The causes of the reductions are unclear and substantial technical effort is underway to determine whether the reductions are associated with water quality issues, flow conditions and habitat availability, or predation or other natural causes, and to develop a response plan. Until the results of this additional work are available, and appropriate mitigation measures in place, Teck Coal may face delays in permitting or restrictions on mining activities in the Elk Valley, including at GHO.

Any negative developments relating to fisheries matters referred to above may result in consequential delays in permitting new mining areas in the Elk Valley or on restrictions being placed on the mining activities in the Elk Valley, which would limit Teck's ability to maintain or increase steelmaking coal production in accordance with long-term plans or to realize the projected mine life of the coal operations, including GHO. The potential shortfall in production may be material and may have a material adverse effect on the operations and business planning.

20.2.2 WATER MANAGEMENT INFRASTRUCTURE

The water management infrastructure is discussed in Section 18.6.

20.2.3 VEGETATION AND WILDLIFE MANAGEMENT

Teck maintains a Regional Invasive Plant Management Plan to track invasive plant infestations, with the objective of minimizing the loss or degradation of reclaimed land, productive forest, wildlife habitat, and associated biodiversity.

Vegetation monitoring is ongoing to evaluate revegetation success at reclaimed sites. Monitoring is also undertaken over undisturbed sites.

Teck maintains an active wildlife monitoring and relocation program and associated models that include wildlife surveys, records of human–wildlife interactions, use of motion sensor cameras to monitor wildlife habitat use and occupancy, and relocation and salvage of amphibian, reptile, and fish species.

20.2.4 SPOIL PILES

Design of layouts for waste rock spoils include considerations for spoil slope stability and selenium management strategies.

Selenium management strategies follow guidelines contained in the report issued by the Strategic Advisory Panel on Selenium Management (SAPSM, 2010).

The geotechnical assessment of spoils considers the requirements in the BC Mine Waste Rock Pile Research Committee (BCMWRPRC) Guidelines on investigation and design (BCMWRPRC, 1991a), operation and monitoring (BCMWRPRC, 1991b), review and evaluation of failure (BCMWRPRC, 1992), and rock drain research program (BCMWRPRC, 1999).

20.2.5 TAILINGS DISPOSAL

Tailings facilities are developed to contain tailings within an enclosed area.

A framework for the management of tailings is presented in Mining Association of Canada (MAC) (1998). Containment structures such as dikes and dams are designed for inflow and seismic criteria established based on the consequences on human life, the environment and the economy from the failure of these structures (CDA, 2007).

20.3 Closure Considerations

The approach to reclamation design and implementation is directed by GHO's overarching end land use and biodiversity objectives:

- Long term safety and stability of drainages, landforms, and features;
- Water quality that meets acceptable quality guidelines for safe release to the surrounding environment and use by local flora and fauna;
- A net positive impact on biodiversity by maintaining or re-establishing self-sustaining landscapes and ecosystems that leads to agreed, viable, long term and diverse land use objectives in Teck's operating areas.

Teck is committed to successfully returning areas disturbed by mining activities to a self-sustaining state by re-vegetating using native plant species and, if required, other mitigation options in the mitigation hierarchy. This involves identifying potential impacts, finding ways to avoid or minimize those impacts, and subsequently achieving gains through rehabilitation, offsets, and other conservation actions. Teck first tries to reduce impacts on biodiversity by avoiding areas of high biodiversity value (e.g., redesigning waste rock piles using a bottom up design to minimize the footprint and avoid future instabilities and additional

disturbance). Following those mitigation efforts, attempts are made to minimize disturbance and reclaim disturbed areas as soon as feasible after mine activities are complete (i.e., progressive reclamation as facilities are no longer required for operations). In cases where impacts remain on the landscape after avoidance, minimization, and rehabilitation, restoration and/or averted loss, offsets would be designed and implemented to support Teck's net positive impact goal.

Reclamation practices and prescriptions are based on established and innovative reclamation techniques, and on the history of successful reclamation conducted at Teck mines to date. The anticipated outcome of this approach is the re-instatement of vegetation dynamics and successional trajectories such that, over time, the landscape is capable of providing ecosystems similar to those that existed prior to mine disturbance.

The reclamation plan is based on the current approved permits and is considered a high-level conceptual plan that will change throughout the active mining period.

Provisional closure costs are considered in the economic analysis that supports the Coal Reserves. Due to the length of the mine life, final closure costs will not be estimated until about five years prior to planned operations cessation.

20.4 Permitting

As of December 31, 2019, all necessary licences and permits and their subsequent amendments are in place for current operations at GHO.

GHO's Environment Department is responsible for obtaining, implementing and maintaining regulatory permits for the operation. The GHO Environmental Management System (EMS) and registration of the GHO EMS to ISO 14001-2004, applies to all permit and regulatory conditions activities within the operations land base.

Permits will be required for the following areas that are included in the LOM plan:

- Site F Rejects Spoil; 2021. For construction start in 2022;
- Cougar Phase 8 by 2022;
- Phase 5 by 2022;
- West Spoil Phase 3 by 2022;
- Cataract Spoil by 2022;
- Cougar Phase 9 by 2025;
- Swift Coal Reserves transfer by 2023.

20.5 Social Considerations

In 2016, the Ktunaxa Nation Council and Teck signed an Impact Management and Benefits Agreement that creates numerous long-term benefits for the Ktunaxa people and increased certainty around future

sustainable mining development in the Elk Valley region. The Impact Management and Benefits Agreement includes the area of the Greenhills operations, and sets out commitments for both parties in the areas of consultation and engagement, environment and land stewardship, employment and business opportunities for Ktunaxa citizens, and cultural resources management.

Teck also works with a number of local partners and organizations on economic, social and environmental initiatives:

- The Elk Valley Economic Initiative (EVEI) is a partnership between Teck, the local Elk Valley communities of Elkford, Fernie and Sparwood, and local First Nations groups to expand and diversify business opportunities in the region, with the aim of increasing the number of permanent Elk Valley residents;
- The Elk River Alliance (ERA) is an organization that brings together individual citizens, local governments, companies, and community groups, with the shared purpose of keeping the Elk River watershed healthy.

21.0 CAPITAL AND OPERATING COSTS

21.1 Introduction

GHO is an on-going operation with significant operating history. Annual budget plans, as well as long-range plans are developed on a regular basis. The plans forecast mine waste volumes, coal tonnage, and operating and capital mine expenditures on an annual basis. The plans are based on historical and projected equipment operating productivities and costs and are reviewed to ensure that the projected equipment and labour operating hours and associated costs are valid.

All aspects of the mining process are included in the operating plans, including waste mining, processing, and logistical and reclamation activities. Indirect costs such as taxes, royalties, administration and overhead are also detailed on an annual basis. Included in the planning process is an estimate of the future expected price of GHO coal, which is jointly provided by Teck's marketing and finance departments.

As part of the long-range planning process, sensitivity analyses are carried out to evaluate changes in operating and capital expenditures as well as variations in coal pricing and exchange rates.

Capital and operating costs forecasts are prepared to meet a ±25% accuracy range.

21.2 Capital Cost Estimates

Capital expenditures for development of new mining areas and equipment acquisitions and replacements are developed and a schedule of the spending is prepared. Costs are based on vendor quotes, and forecasts based on past operating experience, depending on the level of detail required for the cost estimate, and the timing of the capital expenditure.

Large equipment replacements (shovels, loaders, trucks, drills) are calculated based on the mine schedule and the equipment's standard life expectancy. Other costs are based on a five-year estimation window, in which detailed estimates are provided for specific capital spend by each department. Costs for the remaining mine life after the five-year window are based on average expenditure, and pro-rated based on material movement each year.

LOM capital cost forecasts are summarized in Table 21-1 for the period 2020–2065. In this table:

- Mining equipment includes the capital costs required to purchase haul trucks, shovels, drills, loaders and support equipment;
- Plant and infrastructure include expenditures required to sustain plant operations and maintain the integrity of site utilities;
- Pit development includes permitting, access, pre-development work, and infrastructure costs;
- Sustainability includes the capital costs required for water treatment, reclamation, and infrastructure required to minimize environmental impact.

Table 21-1: LOM Capital Cost Estimate

Capital Expenditures	(000's C$)
Mining equipment	$1,922,582
Plant & infrastructure	$221,735
Infrastructure	$306,084
Pit development	$370,798
Sustainability	$610,372
Total capital	***$3,431,571***

21.3 Operating Cost Estimates

Anticipated LOM operating costs are included in Table 21-2 for the period 2020–2065. In this table:

- Mining and processing costs include all labour, fuel, electrical power, consumables, repair parts and external services;
- Transportation costs include logistical costs related to the transport of clean coal products from site to customers;
- “Other” includes capital lease payments, exploration and head office allocations.

The operating costs include allocations for costs incurred when a portion of the coal is sent to the Fording River plant for treatment. This is not a consistent practice, but occurs on an as-required, as-needs basis. The Fording River Operations bill process costs incurred from processing this coal back to GHO on a dollar per tonne basis.

Table 21-2: LOM Operating Cost Estimate

Operating Costs	(C$/t clean coal)
Mining and processing	87.78
Transportation	34.43
Other	6.11
Total cash costs	***128.32***

22.0 ECONOMIC ANALYSIS

Teck is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 for technical reports on properties currently in production and where no material production expansion is planned.

Coal Reserve declaration is supported by a positive cash flow.

23.0 ADJACENT PROPERTIES

This section is not relevant to this Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

This section is not relevant to this Report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The QP notes the following interpretations and conclusions, based on the review of data available for this Report.

25.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The GHO mining activities are conducted under a JV agreement, where Teck Coal is Project operator.

Teck Coal and POSCAN own the mine equipment and preparation plant in proportion to their respective JV interests. Under the JV agreement, Teck Coal is the manager and operator of the GHO and takes 80% of all coal produced. POSCAN takes the remaining 20% and pays a quarterly royalty based on the price achieved for GHO coal sales.

POSCAN, pursuant to a property rights grant, has a right to 20% of all coal mined from certain defined lands of the GHO until the end of the operational phase of the joint venture. POSCAN pays Teck a royalty for access to other coal reserves owned by Teck that are processed by GHO equipment and facilities. In effect, the POSCAN royalty is levied at the point of the washplant, and the POSCAN royalty applies to 20% of the material that is processed by that plant. On February 11, 2019, Teck agreed with POSCAN to substantially increase the royalty paid by POSCAN in respect of its 20% share of production.

Information from legal experts and Teck's in-house experts support that the mining tenure held is valid and sufficient to support a declaration of Coal Resources and Coal Reserves.

Teck holds sufficient surface rights to allow mining activities.

Royalties are payable to the Province of British Columbia.

25.3 Geology and Mineralization

The Project "geology type" is classified by the Geological Survey of Canada as "complex".

The "deposit type" is classified as a "surface mining" type, also based on Geological Survey of Canada criteria.

The quality of the coal in the Mist Mountain Formation seams varies with depth of burial and location along the strike of the deposit. Most coal products produced by GHO require a blend of coal mined from two or more seams, and possibly coal from different mining areas.

The geological understanding of the settings, lithologies, and structural controls on the coal seams is sufficient to support estimation of Coal Resources and Coal Reserves. The geological knowledge of the area is also considered sufficient to reliably inform mine planning.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

The exploration programs completed to date are appropriate for the “complex” style.

Sampling methods are acceptable for Coal Resource and Coal Reserve estimation.

Sample preparation, analysis and security are generally performed in accordance with coal industry accepted practices and standards.

The quantity and quality of the lithological, geotechnical, collar and down-hole survey data collected during the exploration and delineation drilling programs are sufficient to support Coal Resource and Coal Reserve estimation. The collected sample data adequately reflect seam dimensions, seam true widths of mineralization, and the “complex” seam style. Sampling is representative of the coal quality.

The data verification programs concluded that the data collected from the Project adequately support the geological interpretations and constitute a database of sufficient quality to support the use of the data in Coal Resource and Coal Reserve estimation.

25.5 Metallurgical Testwork

Metallurgical testwork and associated analytical procedures were appropriate to the mineralization type, appropriate to establish the optimal processing routes, and were performed using samples that are typical of the coal seams found within the Project area.

Samples selected for testing were representative of the various seam types. Samples were selected from a range of depths within the GHO area. Sufficient samples were taken so that tests were performed on sufficient sample mass.

The bituminous coal seams at GHO are blended to produce coal with consistent quality for either HCC or SHCC products.

Predicted yields are continuously evaluated to more closely match the actual plant performance.

25.6 Coal Resource Estimates

The Coal Resource estimation for the Project conforms to industry best practices and is reported using the 2014 CIM Definition Standards.

The Coal Resources are forward-looking information and actual results may vary.

Factors that may affect the Coal Resource estimate include: changes to long-term coal price assumptions; changes in geological interpretations including the size, shape and distribution of interpreted lithologies; changes in local interpretations of seam geometry, fault geometry and seam continuity; changes to coal recovery assumptions; changes to the input assumptions used to derive the conceptual open pit outlines used to constrain the estimate; variations in geotechnical, hydrogeological and mining assumptions; and changes to environmental, permitting and social license assumptions.

There is upside potential for the Project if some or all of the Measured and Indicated Coal Resources can be converted to Coal Reserves, and if some or all of the Inferred Coal Resources can be converted to higher-confidence categories and subsequently to Coal Reserves.

25.7 Coal Reserve Estimates

The Coal Reserve estimation for the Project incorporates industry-accepted practices and meets the requirements of the 2014 CIM Definition Standards.

The Coal Reserves are forward-looking information and actual results may vary.

Coal Resources were converted to Coal Reserves using a detailed mine plan, an engineering analysis, and consideration of appropriate modifying factors.

Areas of uncertainty that may materially impact the Coal Reserve estimates include: changes to long-term coal price assumptions; changes in geological interpretations including the size, shape and distribution of interpreted seams and waste; changes in local interpretations of seam geometry, fault geometry and seam continuity; changes to the input assumptions used to derive the open pit outlines used to constrain the estimate; variations in geotechnical, hydrogeological and mining assumptions; changes to environmental, permitting and social license assumptions.

25.8 Mine Plan

Mining operations can be conducted year-round.

The open pit mine plans are appropriately developed to maximize mining efficiencies, based on the current knowledge of geotechnical, hydrological, mining and processing information on the Project.

The mining operations use conventional truck-and-shovel methods. As a result of delivery requirements and varying coal seam qualities it is necessary to have multiple coal seams exposed at any time.

GHO currently produces coal from two active pit phases (Cougar Phases 4 and 7) using open-pit coal mining methods, with primary waste stripping and coal mining completed by shovels and rear dump haul trucks. An additional three phases (Cougar Phases 8, and 9, and Swift (GHO)) are planned.

The Coal Reserves support a mine life to 2065 including significant raw coal tonnes from GHO pits being processed at Fording River Operations.

As part of day-to-day operations, Teck will continue to perform reviews of the mine plan and consider alternatives to, and variations within, the plan. Alternative scenarios and reviews may be based on ongoing or future mining considerations, evaluation of different potential input factors and assumptions, and corporate directives.

25.9 Recovery Plan

The process methods in use are conventional to the industry. The processes are widely used in the coal industry with no significant elements of technological innovation.

25.10 Infrastructure

All key infrastructure is built, and the mine is operating. Some new haul roads, spoil piles and environmental control systems will be required for future developments and are included in the mine planning and Project economics.

The existing infrastructure, staff availability, existing power, water, and communications facilities, and the methods whereby goods are transported to the mine are all in place and well-established, and can support the estimation of Coal Resources and Coal Reserves.

Mining operations are conducted on a year-round basis.

25.11 Environmental, Permitting and Social

Environmental and social management plans were developed in support of operations.

Environmental liabilities for the operations are typical of those that would be expected to be associated with an operating coal mine. GHO has made provisions to limit environmental liability by reclaiming disturbed areas on an ongoing basis as they become available. An annual reclamation plan is submitted to the British Columbia government, as required as a condition of the mine permit.

In February 2018, the Government of Canada proposed new regulations under the *Fisheries Act* relating to coal mining effluent. While these regulations are still in development, they could impose significant costs and operating limitations on Teck's steelmaking coal operations. Teck cannot operate the Elk Valley coal mines, including GHO, in compliance with the *Fisheries Act* and its current associated regulations.

During the third quarter of 2018, Teck Coal received notice from Canadian federal prosecutors of potential charges under the *Fisheries Act* in connection with discharges of selenium and calcite from steelmaking coal mines in the Elk Valley. Federal regulatory issues may create additional difficulties in obtaining permits for the Elk Valley operations, whether or not charges are eventually laid, or Teck is successful in defending

any charges. Teck expects that discussions with respect to the draft charges will continue through the first quarter of 2020.

Fish census data obtained in late 2019 showed unexpected and substantial reductions in populations of Westslope Cutthroat trout in certain mine-affected waters in the Elk Valley. The causes of the reductions are unclear, and substantial technical effort is underway to determine causes, and to develop a response plan. Until the results of this additional work are available, and appropriate mitigation measures in place, Teck Coal may face delays in permitting or restrictions on mining activities in the Elk Valley, including GHO.

All necessary licences and permits and their subsequent amendments are in place for current operations at GHO. Monitoring requirements in these licences and permits are undertaken as part of an in-house EMS. Additional permits will be required for Site F rejects spoil, Cougar Phase 8 and Phase 5, West spoil, and Cataract spoil.

Reclamation practices and prescriptions are based on established and innovative reclamation techniques, and on the history of successful reclamation conducted at GHO and other Teck mines to date.

The reclamation plan is based on the current approved permits and is considered a high-level conceptual plan that will change throughout the active mining period.

Provisional closure costs are considered in the economic analysis that supports the Coal Reserves. Due to the length of the mine life, final closure costs will not be estimated until about five years prior to planned operations cessation.

An Impact Management and Benefits Agreement is in place with the Ktunaxa Nation Council.

Teck also works with a number of local partners and organizations on economic, social and environmental initiatives.

25.12 Markets and Contracts

Markets for the metallurgical coal products include Asia, Europe, North and South American customers. GHO production is blended with the products produced from other Teck operations, then sold by Teck.

Quarterly-priced sales represent approximately 40% of coal sales, with the sales balance priced at levels reflecting market conditions when sales are concluded.

Major site contracts include fuel supply, explosives and accessories, and exploration drilling and maintenance support as needed. Contracts are in place with both CPR and CNR for coal transport to the Westshore Terminals, Ridley terminal and the Neptune Bulk Terminals. Contracts are also in place with all terminal facilities to offload, stockpile, blend GHO coal to Teck's product specifications and, load bulk cargo vessels. Teck holds a 46% interest in Neptune Bulk Terminals. Customers arrange for ocean going bulk carriers to transport the coal from the terminals to their facilities for end use.

The QP has reviewed commodity pricing assumptions, marketing assumptions and the current major contract areas, and considers the information acceptable for use in estimating Coal Reserves and in the economic analysis that supports the Coal Reserves.

25.13 Capital Cost Estimates

The capital cost estimates are prepared at a ± 25% accuracy.

The LOM capital cost estimate is $3,431 M. Included in that estimate are:

- Mining equipment includes the capital costs required to purchase haul trucks, shovels, drills, loaders and support equipment;
- Plant and infrastructure include expenditures required to sustain plant operations and maintain the integrity of site utilities;
- Pit development includes permitting, access, pre-development work, and infrastructure costs;
- Sustainability includes the capital costs required for water treatment, reclamation, and infrastructure required to minimize environmental impact

25.14 Operating Cost Estimates

The operating cost estimates are prepared at a ± 25% accuracy.

The LOM average cash cost estimate is $128.32/t clean coal. Included in that estimate are:

- Mining and processing costs include all labour, fuel, electrical power, consumables, repair parts and external services;
- Transportation costs include logistical costs related to the transport of clean coal products from site to customers;
- “Other” includes capital lease payments, exploration and head office allocations.

The operating costs include allocations for costs incurred when a portion of the coal is sent to the Fording River plant for treatment. This is not a consistent practice, but occurs on an as-required, as-needs basis. The Fording River Operations bill process costs incurred from processing this coal back to GHO on a dollar per tonne basis.

25.15 Economic Analysis

Teck is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 for technical reports on properties currently in production and where no material production expansion is planned.

Coal Reserve declaration is supported by a positive cash flow.

25.16 Risks

The major risks facing the operations are water management and quality, and obtaining the required permits to allow the execution of the LOM plan as envisaged.

25.17 Conclusions

Under the assumptions in this Report, the GHO show a positive cash flow over the life-of-mine and support Coal Reserves. The mine plan is achievable under the set of assumptions and parameters used.

26.0 RECOMMENDATIONS

As GHO is an operating mine, with no planned expansions, the QPs have no meaningful recommendations to make.

27.0 REFERENCES

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