

# BC Geological Survey Coal Assessment Report 1078

for the Hermann Area 'A' coal property, British Columbia

## COAL ASSESSMENT REPORT TITLE PAGE AND SUMMARY

### TITLE OF REPORT:

**Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia**

**TOTAL COST: \$4,979.73 (for tenure 417327)**

**AUTHOR(S): C.G. Cathyl-Huhn P.Geo**

**SIGNATURE(S):**

**NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): CX-9-9 / February 11, 2019**

**YEAR OF WORK: 2020-2021 licence term**

**REPORT DATE: February 18, 2022**

**PROPERTY NAME: Hermann Project (164053)**

**COAL LICENSE(S) AND/OR LEASES ON WHICH PHYSICAL WORK WAS DONE: Coal Licences 417036 (Peace River Coal) and 417327 and 383181 (both Conuma Resources)**

[note: costs and statistics are given for tenure 417327 only]

**MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 93P 031**

**MINING DIVISION: Liard (Peace region)**

**NTS / BCGS: NTS 93I/14 and 93P/3 BCGS 093P.004 and 093I.094**

**LATITUDE: 55° 00' 04.5" N**

**LONGITUDE: 121° 08' 50.5" W (at centre of work)**

**UTM Zone: 10N EASTING: 618500 NORTHING: 6096500**

**OWNER(S): Conuma Resources Limited**

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**OPERATOR(S): Conuma Resources Limited**

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### REPORT KEYWORDS

**geotechnical drilling, hydrogeological drilling, Cruiser Formation, Goodrich Formation, Hasler Formation, Boulder Creek Formation, Hulcross Formation**

### REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:

**Coal Assessment Report 950, 999, and 1075 (principal references); also Reports 515, 609, 614, 616, 617, 618, 724, 739, 746, 753, 910, 942, 1057, and 1059**

*Hermann\_A-2021\_220218f.doc  
[1078]*

Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia

SUMMARY OF TYPES OF WORK IN THIS REPORT		EXTENT OF WORK (in metric units)	ON WHICH TENURES
GEOLOGICAL (scale, area)			
	Ground, mapping	none	not applicable
	Photo interpretation	none	not applicable
GEOPHYSICAL (line-kilometres)			
	Ground (Specify types)	none	not applicable
		none	not applicable
	Airborne (Specify types)	none	not applicable
		none	not applicable
	Borehole	none	not applicable
	Gamma -- none	none	not applicable
	Resistivity -- none	none	not applicable
	Caliper -- none	none	not applicable
	Deviation -- none	none	not applicable
	Dipmeter -- none	none	not applicable
	Other -- none	none	not applicable
	Other -- none	none	not applicable
	Core -- <b>none</b>	none	not applicable
	Non-core -- <b>1 ODEX hole</b>	<b>7.6 metres</b>	<b>417327</b>
SAMPLING AND ANALYSES			
Total number of samples: <b>nil</b>			
	Proximate (including sulphur and s.g.)	none	not applicable
	Free swelling index (FSI)	none	not applicable
	Light transmittance (oxidation test)	none	not applicable
	Ultimate	none	not applicable
	Gieseler fluidity (ddpm)	none	not applicable
	Ash chemistry (mineral analysis of ash)	none	not applicable
	Petrographic (maceral determination)	none	not applicable
	Vitrinite reflectance	none	not applicable
	Coking	none	not applicable
	Wash tests ( <b>float-sink tests</b> )	none	not applicable
PROSPECTING (scale/area)		none	not applicable
PREPARATORY/PHYSICAL		none	not applicable
	Line/grid (km)	none	not applicable
	Trench (number, metres)	none	not applicable
	Bulk sample(s)	none	not applicable

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## 2 Introduction and situation

This report, titled *Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia*, presents results of a geotechnical and hydrogeological drilling programme conducted during the 2020-2021 work term by Conuma Resources Limited (Conuma). The report has been submitted by Conuma in keeping with obligations under the *Coal Act* and the *Coal Act Regulation*.

### 2.1 Terms of reference of this report

The subject of this report is geotechnical drilling conducted during the 2020-2021 work term, within Conuma's coal licence 417327 ('on-tenure' work, in Area 'A' of the Hermann property), Conuma's coal licence 383181 (Area 'C' of the Hermann property), and Peace River Coal's adjoining coal licence 417306 ('off-tenure' work), in support of a mine permit amendment for a planned open pit. The mine permit amendment application is, at time of writing this report, undergoing the provincial mine review process. Work within tenure 417036 was undertaken subject to an access agreement between Peace River Coal and Conuma Resources Limited.

### 2.2 Property description

The Hermann coal property consists of provincially-granted Crown coal tenures comprising thirteen Coal Licences, numbered 383180-383183, 405136-405142, 417327, and 417485. All tenures are contiguous, with no freehold inholdings or adjacencies. Tenure 417327 is informally referred to as Area 'A' of the Hermann property. Tenure 417036, adjoining tenure 417327 (**Map 2-2**), is owned by Peace River Coal, and is not part of Conuma's holdings.

An application to convert coal licences 383180, 383181, 383182, 383183, 405139, 417327, and 417485 into a coal lease was submitted by Conuma in October of 2019. At the time of this report's writing, the application is still being considered by the Crown.

### 2.3 Property history

The Hermann coal licences were awarded by the Crown to Western Canadian Coal Corp. (WCCC) between the years 2000 and 2006, and subsequently acquired by Walter Energy Inc. and associated firms – including the Walter Canadian Coal Partnership (WCCP) – in the course of a corporate merger in 2011. In 2016, WCCP's ownership of the Hermann property was transferred to Conuma Coal Resources Limited, as part of a regional-scale purchase of WCCP's tenures.

### 2.4 Current physical work

Physical work (during the 2020-2021 work term) within tenure 417327 (Area 'A' of the Hermann coal licences), within tenure 383181 (part of Area 'C' of the Hermann coal licences), and also within adjoining tenure 417036 (held by Peace River Coal, and accessed by agreement) comprises the drilling of 11 boreholes with total length of 92.8 metres. Of these boreholes:

- current on-tenure work within Conuma's Area 'A' tenure 417327 comprises the drilling of 1 borehole, which did not reach rockhead, with a total length of 7.6 metres;
- current near-tenure work within Conuma's Area 'C' tenure 383181 comprises the drilling of 3 boreholes, two of which reached rockhead (although not reaching Falher Member coal-measures), with a total length of 15.5 metres; and
- current off-tenure work within Peace River Coal's tenure 417036 comprises the drilling of 7

shallow boreholes which did not reach rockhead, with a total length of 69.7 metres.

Note: The three boreholes drilled within Conuma's tenure 383181 have been previously reported in coal assessment report (CAR) 1059, and are here again-mentioned for convenience.
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Positions, depths, and details of boreholes are reported within **Tables 2-3, A-1, and A-2**.

**Appendix A** presents construction details of boreholes drilled during the 2020-2021 work term. This appendix lacks geophysical logs, as geophysics was not run within the study area during the 2020-2021 term.

Estimated on-property cost of exploratory work on tenure 417327 during the 2020-2021 work term is \$4,979.73, for a unit cost of \$654.40 per metre drilled. Estimated costs of off-property work on tenure 417036 (held by Peace River Coal) is \$45,806.93, for a unit cost of \$654.40 per metre drilled. Further discussion of costs is presented within **Chapter 7** of this report, and summarised in **Tables 7-1 through 7-4**.

CAR-950, -999, -1057, -1059, and -1075 are the primary background reference sources for the present report, and the interested reader is directed there to obtain a more detailed recounting of the broader geological setting of the Hermann coal property, including details of the Falher coal-measures which host the majority of the mineable coal in the Mt. Hermann area of northeastern British Columbia.

## 2.5 Location and access

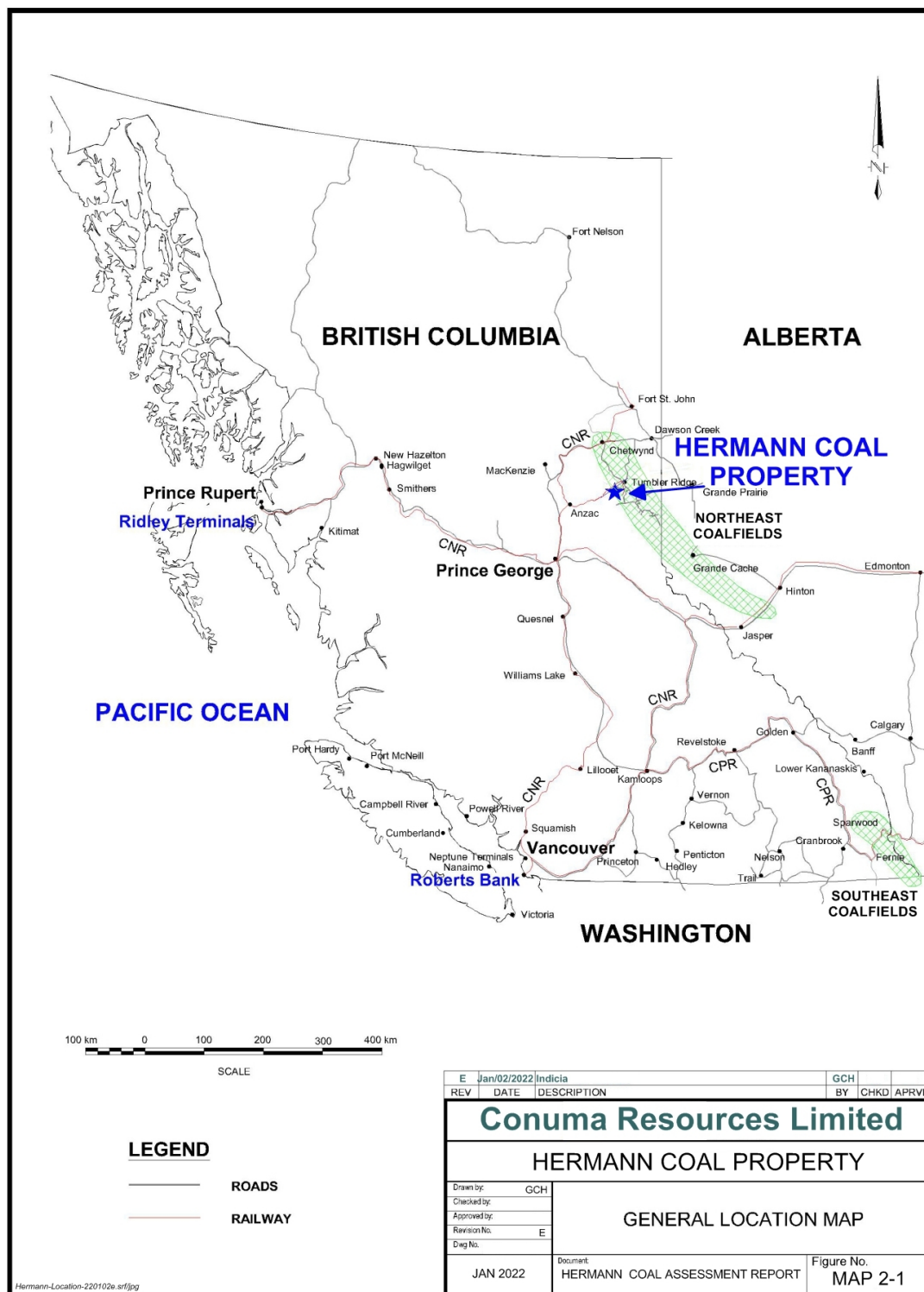
General location of the Hermann coal property is depicted within **Map 2-1** and **Map 2-2**, and coal tenure of the property's Area 'A' (**Table 2-1**) is depicted in relation to the local topographic setting of the Hermann coal property as **Map 2-3**.

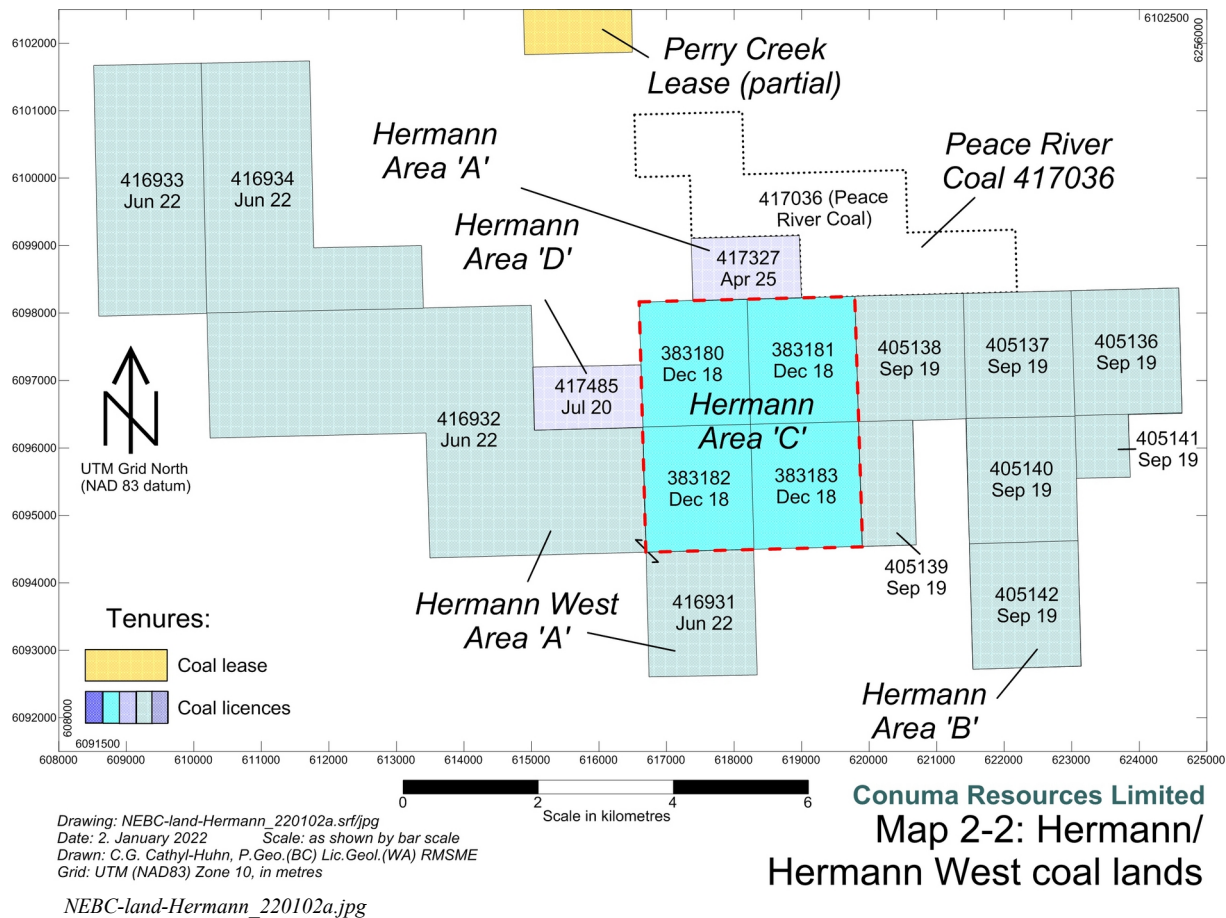
Area 'A' of the Hermann property is accessible via all-weather highways and roads, at a driving distance of 128 kilometres south from Chetwynd town, and 33 kilometres southwest from Tumbler Ridge town, within map-areas 93 P/03 and 93I/14 of Canada's National Topographic System. Highway access is via route BC-29, connecting Chetwynd to Tumbler Ridge, thence southward 15 kilometres on route BC-52E. From a well-marked junction at this point, access is via the first 9 kilometres of the Murray River Forest Service Road (FSR), which passes through two culverted underpasses (signposted as 'tunnels') beneath Quintette Coal Limited's former coal-haulage roads, and then crosses the Murray River.

Immediately past the river-crossing, Quintette's Mesa coal-haulage road, now signposted as the Mast Creek Road (with radio call-name of 'Mast') extends a further 9 kilometres westward to its crossing with the non-status Nabors Road, which extends southward into Area 'A' of the Hermann coal property (as highlighted on **Map 2-3**).

From this junction, the Mesa coal-haulage road extends northwestward to the former Quintette Mine open-pits atop Mt. Sheriff and Mt. Frame. Also from this junction, the northward extension of the Nabors Road is also sign-posted as the Mast Creek Road; following this route an additional 13.9 kilometres northward eventually leads to a steel bridge across Wolverine River, and a junction at kilometre 8.3 of the Wolverine FSR.

Hermann-Location-220102e.jpg





### 2.5.1 Road and trail access details

The non-status Nabors Road runs generally southerly through Area 'A' and past its southern boundary, ultimately ending at a natural-gas well (d-64-J 93-I-14) situated south of the Hermann property's southern boundary (but within Conuma's adjoining Hermann West coal property). A network of forestry trails extends outward to the east and west of the Nabors Road. These trails are in various states of repair, but most are presently suitable as walking routes, or for usage by tracked vehicles. With modest effort at removing tank-traps and restoring culverts, they can be made trafficable for trucks, tracked vehicles, and drilling-rigs.

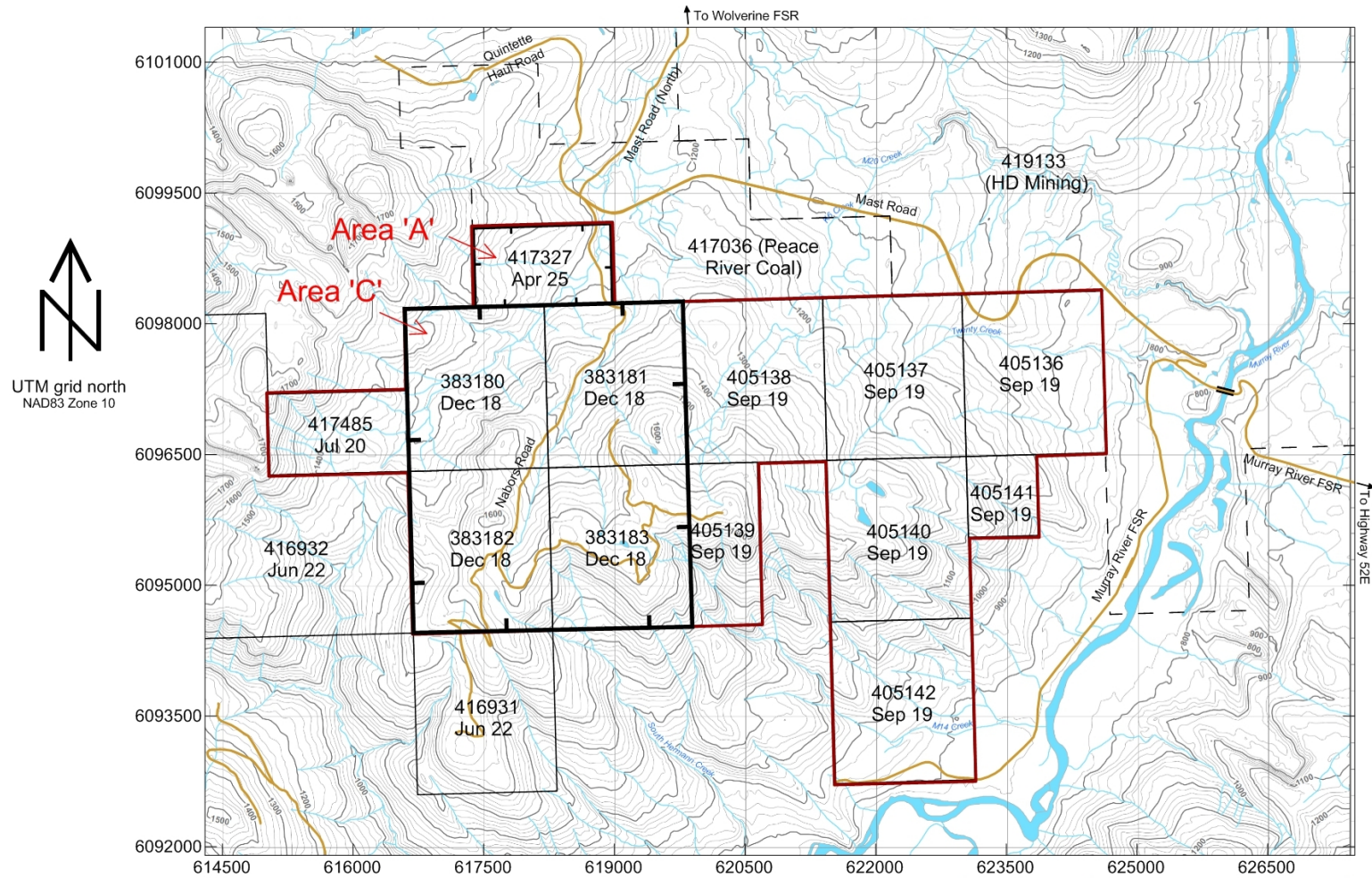
### 2.5.2 Airborne access

An unattended, paved airstrip is situated south of Tumbler Ridge; the airstrip is served by various chartered air-transportation firms, from airports at Prince George, Chetwynd and Dawson Creek. Numerous helicopter landing-points are available along logging-roads.

### 2.5.3 Regulatory setting of surface access

Surface access for drilling and other exploratory works is regulated by the provincial government, subject to the *Coal Act Regulations* and the *Mines Act*.





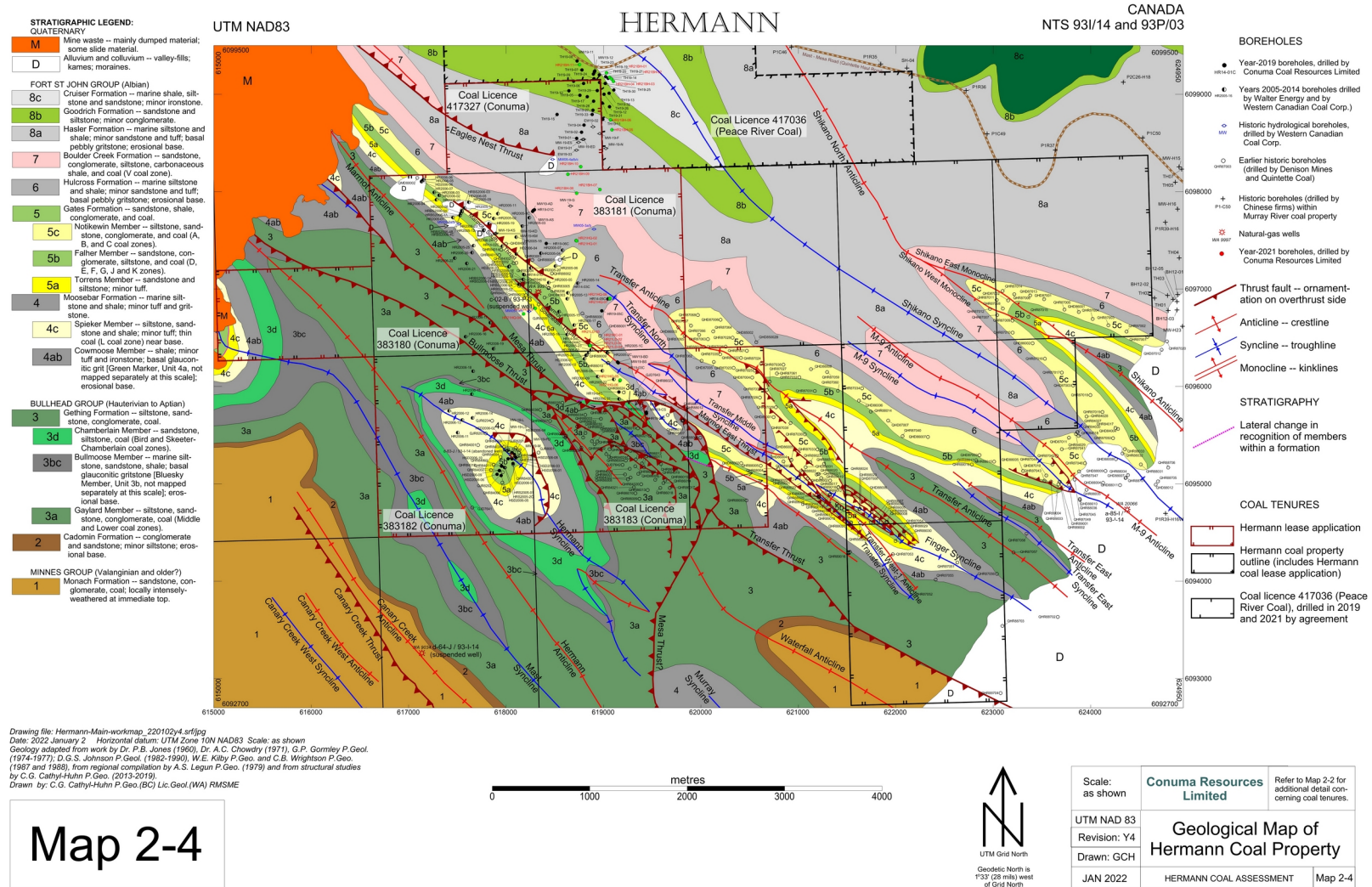
File: Hermann-regional-topography\_220115f.srf/jpg  
 Drawn: C.G. Cathyl-Huhn PGeo LicGeol RMSME  
 Projection: Universal Transverse Mercator Scale: as shown  
 Grid: UTM NAD83 Zone 10 (in metres) Date: 15 Jan 2022  
 Base map from Lorax Environmental  
 Tenure information from Mineral Titles Online

**Conuma Resources Limited**  
 Hermann coal tenures

**Map 2-3: Coal tenure and topography**

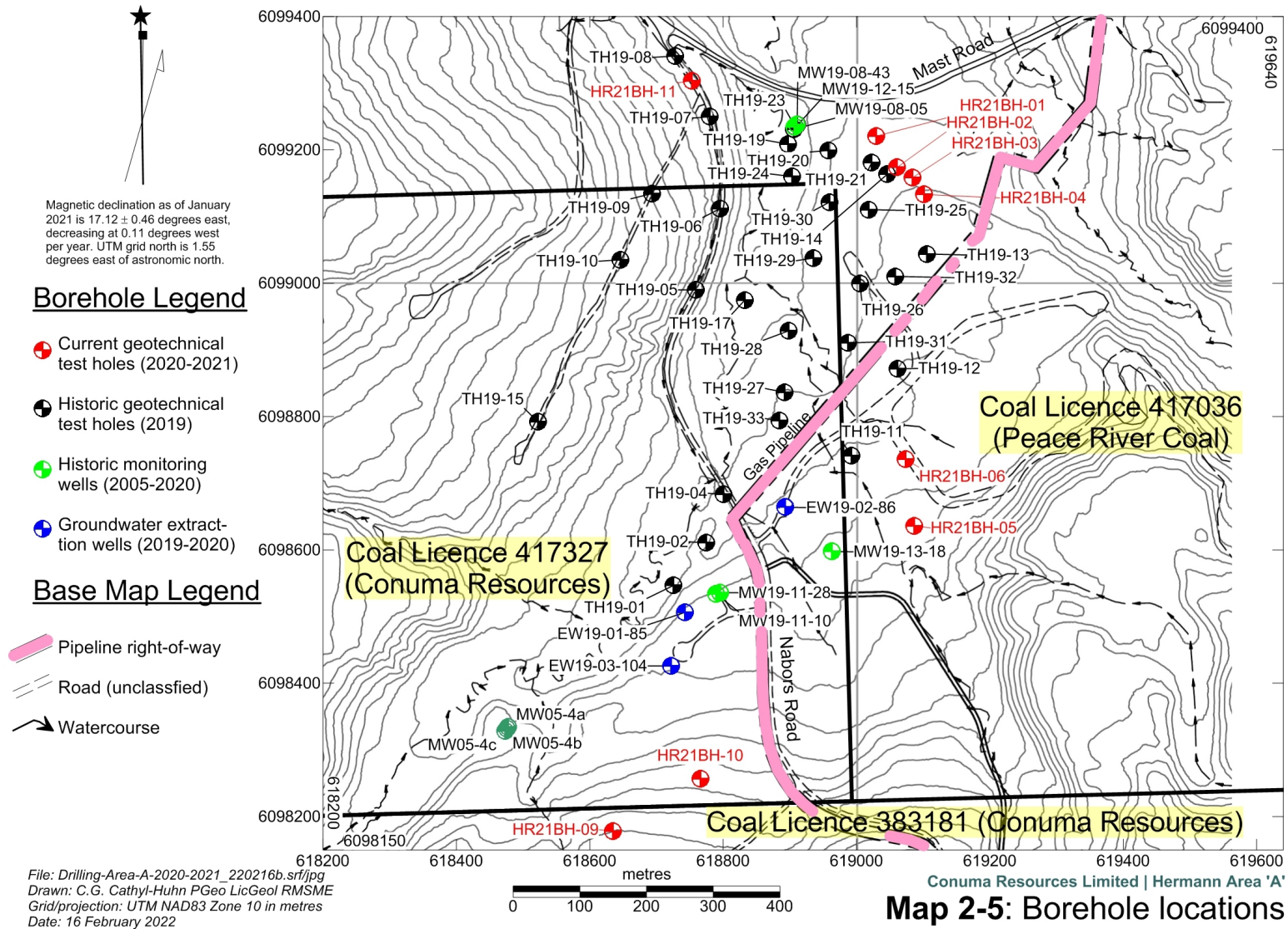
Hermann-regional-topography\_220115f.srf/jpg

# Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia



Hermann-Main-workmap\_220102y4.srf.jpg





Drilling-Area-A-2020-2021\_220216b.jpg

## 2.6 Coal tenure details

The Hermann property as a whole (including Area 'A') comprises 13 coal licences (**Maps 2-2 and 2-3**), acquired from the Crown by Western Canadian Coal at various times between the years 2000 and 2006, transferred to Walter Energy after its acquisition of Western Coal., and now held by Conuma. **Table 2-1** presents details of the single coal licence (tenure 417327 with anniversary date of April 25<sup>th</sup>) which comprises Area 'A' of the Hermann property. The outline of Area 'A' is highlighted on **Map 2-2** and **Map 2-3**.

Coal licences grant to their holder the exclusive right to explore for coal, subject to consultation with local First Nations, coordination of access with other tenure-holders (such as oil and gas firms, other mineral-tenure holders, guide-outfitters, trappers, and timber companies), and the successful submission of an exploratory work plan. Coal licences do not, in and of themselves, confer the ownership of coal upon their holder (as the coal remains the property of the Crown via the province of British Columbia), but they can under appropriate circumstances be converted into coal leases, upon which a scheme of mining may be established. A coal lease application has recently (October, 2019) been made, covering portions of the Hermann coal property.

The term of coal licences is one year, which may normally be extended upon the payment of an area-based annual rental fee as prescribed by the provincial *Coal Act Regulation*. Area 'A' is now within its fourth five-year span of increased rental fees, at \$20/hectare.

**Table 2-1:** Coal tenure comprising Area 'A' of Hermann coal property

Land description			Area (ha)	Dates		Annual rental rate (\$/ha)	Annual rental fee (rate x area)
Tenure	Blocks	Units		Issued on	Renew by		
417327	93P/3 Block B	22, 23	149	Apr.25, 2006	Apr.25, 2022	\$20	\$2980
1 coal licence / 2 units			149				\$2980

Non-coal tenures also exist:

- The Hermann coal property as a whole, including Area 'A', is situated within Block 4 of Canfor Inc.'s Tree Farm Licence No.48.
- The property is furthermore situated within the Dawson Creek Land and Resource Management Plan area, and the Foothills Resource Management Zone, allowing for multiple resource uses, including coal-mining.
- Oil and gas tenures exist throughout the Hermann coal property, including Area 'A'.

Pipeline crossings have been made by Canfor, in the course of forestry operations. A pipeline right-of-way through Area 'A' is shown on **Map 2-5**. No natural-gas wells lie within Area 'A'.

## 2.7 Infrastructure and geomatics

Electrical power is potentially available from B.C. Hydro's Quintette substation, served by 230-KV transmission line 2L323, although no distribution lines are presently in place near the Hermann property. Sub-transmission and distribution lines, formerly serving the Quintette mines at Mt. Sheriff and Mt. Frame, were removed subsequent to those mines' closure.



Telecommunications are available via satellite and cellular telephone systems. Satellite access is excellent in upland areas, but unreliable in the heavily-wooded hillsides. Cellular coverage also likely to be inconsistent, owing to distance from transmitters, and issues of line-of-sight in mountainous country.

Base-mapping for Hermann is freely available from the provincial government's Base Map Online Store, which affords a facility for downloading shaded-relief topographic maps of the British Columbia Geographic System (BCGS) at 1:20,000 scale. BCGS map-sheets 093I.094, 093I.095, 093P.004, and 093P.005 cover the property and adjoining areas.

Georeferenced satellite photography is freely available via the *Google Earth* web-service. In general, this imagery is sufficiently detailed for studies of gross geological and geomorphological structure, and for the general tracing of roadways and vehicular access trails, but its level of detail is insufficient to allow for trafficability determinations.

## **2.8 Physiography, landscapes and climate of Hermann Area 'A'**

Terrain (**Maps 2-3 and 2-5**) of Hermann Area 'A' is gentle to rolling, punctuated by ravines. Two creeks, M20 Creek and Nabors Creek, drain the property. Mixed coniferous and deciduous forest covers the property. Considerable areas have been deforested in the past five years, and the property is now a patchwork of forest (much of it immature or swampy) and forestry cutblocks.

Soil cover is pervasive, consisting mainly of silty, sandy, and gravely alluvium and peat at lower elevations, and till and glaciofluvial gravel at higher elevations.

Hermann has a continental montane to alpine climate, characterised by long, moderately cold, snowy winters and short, rainy, warm summers. Snow and frost may occur in any month of the year, and isolated snowfields persist on north-facing slopes into July. The coldest weather usually occurs from January through March, where temperatures of  $-40^{\circ}\text{C}$  occasionally occur. Winds are generally gusty and ongoing, with rare calm periods. Convective thunderstorms frequently occur during summer months, bringing intense rain-showers and occasional hail.

## **2.9 Synopsis of current (2020-2021 work term) drilling**

'Current work', for the purposes of this report, comprises drilling (**Map 2-5, Tables 2-2 and 2-3, and Appendices A and B**), and surveying of testholes and wells. In all, 11 test holes were drilled within or adjacent to Hermann Area 'A', during the 2020-2021 work term -- all of them for geotechnical investigations, and two of them receiving piezometer installations.

- Amongst these 11 holes, 7 were drilled off-tenure (on coal licence 417036, held by Peace River Coal) as part of geotechnical and hydrological investigations in support of mine facility design. The off-tenure work was done by agreement with Peace River Coal;
- Three testholes were drilled within Conuma's coal licence 383181 (part of Hermann Area 'C', lying to the south of Conuma's Area 'A' licence 417327); and
- Only one testhole was drilled within tenure 417327 itself.

None of these eleven testholes entered known or potentially coal-bearing rocks.

**Table 2-2:** Current drilling during 2020-2021 work term, on- and off-tenure

Testhole	UTM NAD83 Zone 10		Elevation	TD	Drilling method	Azimuth	Dip	Tenure	Domain
	Easting	Northing							
HR21BH-01	619029.64	6099220.63	1177.48	10.5	ODEX	0	-90	417036	PRC land
HR21BH-02	619060.84	6099173.8	1179.25	10.5	ODEX	0	-90	417036	PRC land
HR21BH-03	619083.73	6099158.19	1179.62	12.0	ODEX	0	-90	417036	PRC land
HR21BH-04	619101.41	6099133.14	1180.05	10.1	ODEX	0	-90	417036	PRC land
HR21BH-05	619086.54	6098636.25	1192.68	9.0	ODEX	0	-90	417036	PRC land
HR21BH-06	619073.19	6098736.31	1186.48	8.8	ODEX	0	-90	417036	PRC land
HR21BH-07	618963.8	6098021.58	1274.32	4.0	ODEX	0	-90	383181	Area C
HR21BH-08	618724.13	6097983.2	1268.78	2.4	ODEX	0	-90	383181	Area C
HR21BH-09	618634.35	6098178.08	1229.61	9.1	ODEX	0	-90	383181	Area C
HR21BH-10	618765.87	6098256.76	1217.24	7.6	ODEX	0	-90	417327	Area A
HR21BH-11	618753.1	6099303.63	1185.49	8.8	ODEX	0	-90	417036	PRC land

**Table 2-3:** Current drilling during 2020-2021 work term, on-tenure only

Testhole	UTM NAD83 Zone 10		Elevation	TD	Drilling method	Azimuth	Dip	Tenure	Domain
	Easting	Northing							
HR21BH-10	618765.87	6098256.76	1217.24	7.6	ODEX	0	-90	417327	Area A
HR21BH-07	618963.8	6098021.58	1274.32	4.0	ODEX	0	-90	383181	Area C
HR21BH-08	618724.13	6097983.2	1268.78	2.4	ODEX	0	-90	383181	Area C
HR21BH-09	618634.35	6098178.08	1229.61	9.1	ODEX	0	-90	383181	Area C

Note: testholes -07, -08, and -09 are drilled within tenure 383181 (in Hermann Area 'C'), and as such have previously been statistically reported in Coal Assessment Report 1059.

Historic and current geotechnical and hydrological drilling concentrated on investigating the material characteristics and aquifer potential of unconsolidated and semi-consolidated Drift. Some of the hydrological boreholes did penetrate a few to several tens of metres into bedrock (Helsen *et al.*, 2019), as investigations turned to a search for bedrock aquifers.

## 2.10 Further comments on historic (prior to 2020-2021) work

No drilling from before the 2020-2021 work term is known to have been done on Peace River Coal's tenure 417036, and none is expected to have been seriously-proposed, owing to the lack of outcropping coal-bearing strata within the tenure.

Historic drilling within Conuma's tenure 417327 was a cluster of three groundwater-monitoring wells (MW05-4a, -4b, and -4c), drilled in 2005 as part of the mine-permitting process for the then-proposed North Pit of Hermann Mine, followed by the testholes, monitoring wells, and groundwater extraction wells drilled during the 2019-2020 work term.

No outcropping coal was observed during historic regional exploration of what is now Area 'A'. Other than a small area of possibly coal-bearing Boulder Creek Formation (**Maps 2-4 and 3-1**), no coal-measures are known or reasonably expected to subcrop within Area 'A'.

**Table 2-4: Historic drilling during 2005-2020 work terms**

Testhole / well	UTM NAD83 Zone 10		Elevation	TD	Drilling method	Azimuth	Dip	Tenure	Domain
	Easting	Northing							
MW05-4a	618477.7	6098334.4	1201.44	81.7	rotary	0	-90	417327	Area A
MW05-4b	618475.4	6098331.8	1201.44	51.2	rotary	0	-90	417327	Area A
MW05-4c	618473.5	6098328.8	1201.44	13.0	rotary	0	-90	417327	Area A
TH19-01	618725.32	6098546.63	1183.53	17.0	sonic	0	-90	417327	Area A
TH19-02	618775.03	6098610.46	1184.31	17.0	sonic	0	-90	417327	Area A
TH19-04	618800.14	6098683.01	1182.10	6.7	sonic	0	-90	417327	Area A
TH19-05	618758.89	6098990.18	1186.08	15.3	sonic	0	-90	417327	Area A
TH19-06	618795.54	6099112.10	1183.81	15.3	sonic	0	-90	417327	Area A
TH19-07	618779.97	6099249.77	1185.40	6.7	sonic	0	-90	417036	PRC land
TH19-08	618727.80	6099340.82	1185.02	6.7	sonic	0	-90	417036	PRC land
TH19-09	618693.38	6099134.55	1208.62	15.3	sonic	0	-90	417327	Area A
TH19-10	618645.49	6099035.15	1219.96	12.2	sonic	0	-90	417327	Area A
TH19-11	618992.54	6098741.35	1186.17	9.8	sonic	0	-90	417036	PRC land
TH19-12	619061.09	6098871.48	1184.68	6.7	sonic	0	-90	417036	PRC land
TH19-13	619105.24	6099043.81	1181.83	6.7	sonic	0	-90	417036	PRC land
TH19-14	619046.16	6099163.49	1179.15	6.7	sonic	0	-90	417036	PRC land
TH19-15	618522.40	6098791.87	1219.99	15.7	sonic	0	-90	417327	Area A
TH19-17	618832.63	6098974.88	1172.36	10.1	sonic	0	-90	417327	Area A
TH19-19	618897.18	6099208.60	1166.48	15.7	sonic	0	-90	417036	PRC land
TH19-20	618957.99	6099199.27	1175.60	12.7	sonic	0	-90	417036	PRC land
TH19-21	619022.92	6099181.26	1181.78	12.8	sonic	0	-90	417036	PRC land
TH19-23	618907.57	6099234.82	1166.25	12.7	sonic	0	-90	417036	PRC land
TH19-24	618903.34	6099160.09	1172.69	12.7	sonic	0	-90	417036	PRC land
TH19-25	619018.47	6099110.32	1179.55	6.7	sonic	0	-90	417036	PRC land
TH19-26	619005.06	6098999.35	1178.10	6.7	sonic	0	-90	417036	PRC land
TH19-27	618892.45	6098836.37	1180.57	9.8	sonic	0	-90	417327	Area A
TH19-28	618898.27	6098928.64	1176.10	6.7	sonic	0	-90	417327	Area A
TH19-29	618935.69	6099037.78	1176.21	6.7	sonic	0	-90	417327	Area A
TH19-30	618959.40	6099121.71	1176.28	6.7	sonic	0	-90	417036	PRC land
TH19-31	618986.80	6098910.45	1179.83	6.7	sonic	0	-90	417036	PRC land
TH19-32	619058.21	6099010.16	1180.87	6.7	sonic	0	-90	417036	PRC land
TH19-33	618884.43	6098793.59	1181.17	9.6	sonic	0	-90	417327	Area A
MW19-08-05	618906.20	6099231.00	1166.09	4.64	sonic	0	-90	417036	PRC land
MW19-08-43	618910.91	6099238.38	1166.65	45.7	sonic	0	-90	417036	PRC land
MW19-11-10	618789.41	6098534.09	1195.69	10.85	air rotary	0	-90	417327	Area A
MW19-11-28	618795.10	6098536.11	1195.76	30.0	air rotary	0	-90	417327	Area A
MW19-12-15	618906.20	6099231.49	1166.09	16.0	air rotary	0	-90	417036	PRC land
MW19-13-18	618963.15	6098597.71	1190.58	18.0	air rotary	0	-90	417327	Area A
EW19-01-85	618742.4	6098506.2	1196	84.89	air rotary	0	-90	417327	Area A
EW19-02-86	618893	6098664	1186	86.41	air rotary	0	-90	417327	Area A
EW19-03-104	618722	6098426	1200	103.63	air rotary	0	-90	417327	Area A

Note: only GPS locations are available for EW19-01 through -03. 'PRC land' refers to tenure 417036, held by Peace River Coal.. 'Area A' refers to tenure 417327, held by Conuma.

### **2.11 Natural gas wells**

Natural gas wells have not been drilled within Hermann Area 'A' (tenure 417327). A pipeline right-of-way does cross the area, as shown in pink on **Map 2-5**.

### **2.12 Acknowledgements and professional responsibility**

Sam Payment GIT, Conuma's manager of permitting and regulatory affairs, gave yeoman service as the company's wrangler of drilling permits. Chris Pichurski PEng, formerly Conuma's capital projects manager, led the geotechnical and hydrological investigations.

Geological and project management support were provided by Apex Geoscience Ltd., led by their project geologist, Jerry Holmes PGeo.

Wood Plc provided supervisory support to the geotechnical drilling programme, led by field technician Bradley Jackman and geotechnical engineer Kim Sinclair P.Eng. Ecofor provided environmental monitoring, led by field supervisor Ryan Dodds and field technician-biologist Jessica Pike.

The author of the present report, Gwyneth Cathyl-Huhn PGeo., accepts overall professional responsibility for the contents of this report, and has duly signed and sealed the original copy thereof.

### 3 Geology

Regional and local bedrock geology (**Maps 2-4 and 3-1**) of the Mt. Hermann area is known mainly from the extensive work of D.F. Stott (1960; 1963; 1968; 1982), and D.W. Gibson (1992) on behalf of the Geological Survey of Canada. Surficial geology (at regional scale) was mapped by T.H.F. Reimchen (1980), also for the Geological Survey of Canada.

Numerous coal-company technical reports (cited in **Section 8** of this report) are available as open-file documents from the British Columbia Geological Survey Branch. Copies of the reports are freely available for download via the provincial Survey's *Coalfile* website. Most of these reports have been censored to exclude clean-coal quality data, as such data are held confidential by the Crown in keeping with the provisions of the *Coal Act Regulation*.

#### 3.1 Regional bedrock geology

The Hermann coal property lies within the Sukunka-Quintette coalfield of northeastern British Columbia, part of the Foothills structural province of the Canadian Cordillera. The majority of sedimentary rocks within the Sukunka-Quintette coalfield are clastic in nature, ranging in grain-size from claystones and mudstones through conglomerates. Lesser amounts of biologically- and chemically-derived sedimentary rocks are present, comprising coals, banded and nodular ironstones, glauconite-rich sandstones and gritstones, and impure dolomites.

Volcanic rocks constitute a very small but stratigraphically-significant component of the Early Cretaceous strata, comprising very fine- to fine-grained tuffs (locally altered to bentonites or tonsteins), interpreted to have originated as wind-borne distal ash-fall deposits from contemporaneous volcanoes situated upwind and far to the southwest of the property. The volcanic rocks characteristically occur as very thin (at most a few decimetres) yet regionally-extensive bands, thus useful as tephrochronological markers for structural and stratigraphic correlations (Duff and Gilchrist, 1981; Kilby, 1984a).

All rocks inferred to subcrop at rockhead within Area 'A' are of Early Cretaceous age, belonging to the Fort St. John (Albian stage) group.

##### 3.1.1 *Tectonostratigraphic context of Early Cretaceous rocks*

During much of the Early Cretaceous, the Western Interior of North America was occupied by a shallow seaway, variably-designated by different authors as the Western Interior Sea, the Boreal Sea, or by analogues of formation names, such as the Clearwater Sea, Hulcross Sea or Moosebar Sea. Depths of the seaway, magnitude of accommodation space for sediments, and overall shoreline trends, were largely controlled by vertical movements within a complexly block-faulted crystalline basement terrane of Precambrian age, the Peace River Arch.

Sediments of the Fort St. John Group were derived from actively-rising thrust-faulted tectonic forelands lying to the west and southwest of the seaway, synchronous with accretion of allochthonous tectonic terranes against the western margin of the North American craton.

Coal deposits formed within the non-marine portions of the clastic sedimentary successions. Kalkreuth and Leckie (1989) recognised the close association between actively-subsiding shoreface sandstone deposits and the overlying presence of thick coal beds. Locally and regionally, this association is well-established within the upper part (Chamberlain Member) of the Gething Formation and the middle part (Falher Member) of the Gates Formation, within the Sukunka-Quintette coalfield, including the Hermann property.

### **3.1.2      *Thin-skinned deformation and thrust-faulting***

The Hermann coal property (including Area 'A') is characterised by a thin-skinned deformational style comprising folded, laterally-arcuate thrust faults and associated fault-bend folds (see regional work by Jones, 1979). Most thrusts are northeast-verging, except for the northern end of the Hermann property (including Area 'A': see **Map 2-4**), where the thrusts are typically southwest-verging (and, hence, termed as 'backthrusts', such as the Eagles Nest backthrust within tenure 417327). The culmination of a northwest-striking triangle zone may separate the zones of northeast-verging and southwest-verging thrust faults and backthrusts.

Within the more intensely-explored Area 'C' of the Hermann property, thrusts range in scale from mesoscopic features with stratigraphic displacements of a few decimetres to a few metres, to regionally-throughgoing faults and fault with stratigraphic displacements of several hundred metres. Similar conditions, with the possible exception of displacements greater than a hundred metres, are postulated to occur within the sparsely-explored bedrock at Area 'A'.

#### **3.1.2.1    Decollement zones**

The Hasler Formation is recognised as a regionally-extensive zone of decollement (tectonic detachment), characterised by near-bedding-parallel thrust faults (Cooper and others, 2004). Other decollement zones, of at least local significance, may be hosted by soft, low-strength tuff bands within the Hulcross and underlying older formations. Such zones are of practical significance to mining, in the event that they are exposed at adverse orientations within mine walls (Rostad and Hogarth, 2019).

## **3.2      Local geology**

A table of formations, including an enumeration of coal beds with coal zones, and estimates of formation thicknesses, is presented as **Table 3-1**. Stratigraphy is discussed in greater detail within **Section 3-3** of this report, which presents regionally-known characteristics of Drift units and of rock-units inferred to form bedrock beneath Area 'A'.

### **3.2.1      *Local stratigraphy***

Within the broader Hermann property, rocks belonging to the uppermost Minnes, Bullhead and all but the uppermost Fort St. John groups are exposed at the ground surface (see **Table 3-1**). Approximately 1130 metres of Bullhead and Fort St. John rocks remain in place, following Tertiary-Quaternary episodes of fluvial erosion and glacial scouring. An additional 1350 metres of Minnes Group strata underlies the Bullhead Group; these deeper rocks are known mainly from the records of natural-gas wells.

Formations interpreted (see **Map 2-3** and **Table 3-1**) as being present at rockhead within Area 'A' and vicinity range downwards from the Cruiser Formation (map-unit 8c, the youngest mapped formation) to the Boulder Creek Formation (map-units 7a, 7b, and 7c). Approximate ages of these rocks range from 100.5 to 105 million years before present.

### **3.2.2      *Local structure***

The broader Hermann coal property consists of a moderately-deformed stack of marine and non-marine strata, generally present in normal ('tops-up') stratigraphic position, albeit with



generally-steep bedding-surface dips. As a general consideration, thrust faults at Hermann are inferred to have developed in the typical downward-younging sequence of successive faulting, although out-of-sequence thrusting is locally possible.

Some of the historic and current hydrogeological wells within the Hermann property's Area 'A' encountered fracture zones within siltstone, suggesting that deformation extends into near-surface rocks within Area 'A'.

Bedding dips within Hermann Area 'A' are not yet known, owing to lack of bedrock outcrops, and lack of borehole cores or dipmeter logs within those few geotechnical test holes and hydrogeological wells which reached bedrock.

### **3.3 Stratigraphic details**

The following discussion presents details of the lithology, inferred age and origin, typical thickness, and contact relationships of the various surficial and bedrock units interpreted to be present at Hermann (whether near-surface or underlying at greater depth), keyed to the regional map-unit numbers used in **Map 2-4**, **Map 3-1**, and **Table 3-1**. Geological units are discussed in stratigraphic order from uppermost (youngest) to lowermost (oldest) within the exposed sequence of strata. Within Area 'A' of the Hermann property, only surficial deposits of map-unit D, and bedrock of map-units 6 through 8c have been encountered by boreholes.

#### **3.3.1 *Surficial deposits***

##### **3.3.1.1 Anthropogenic deposits (including map-unit M)**

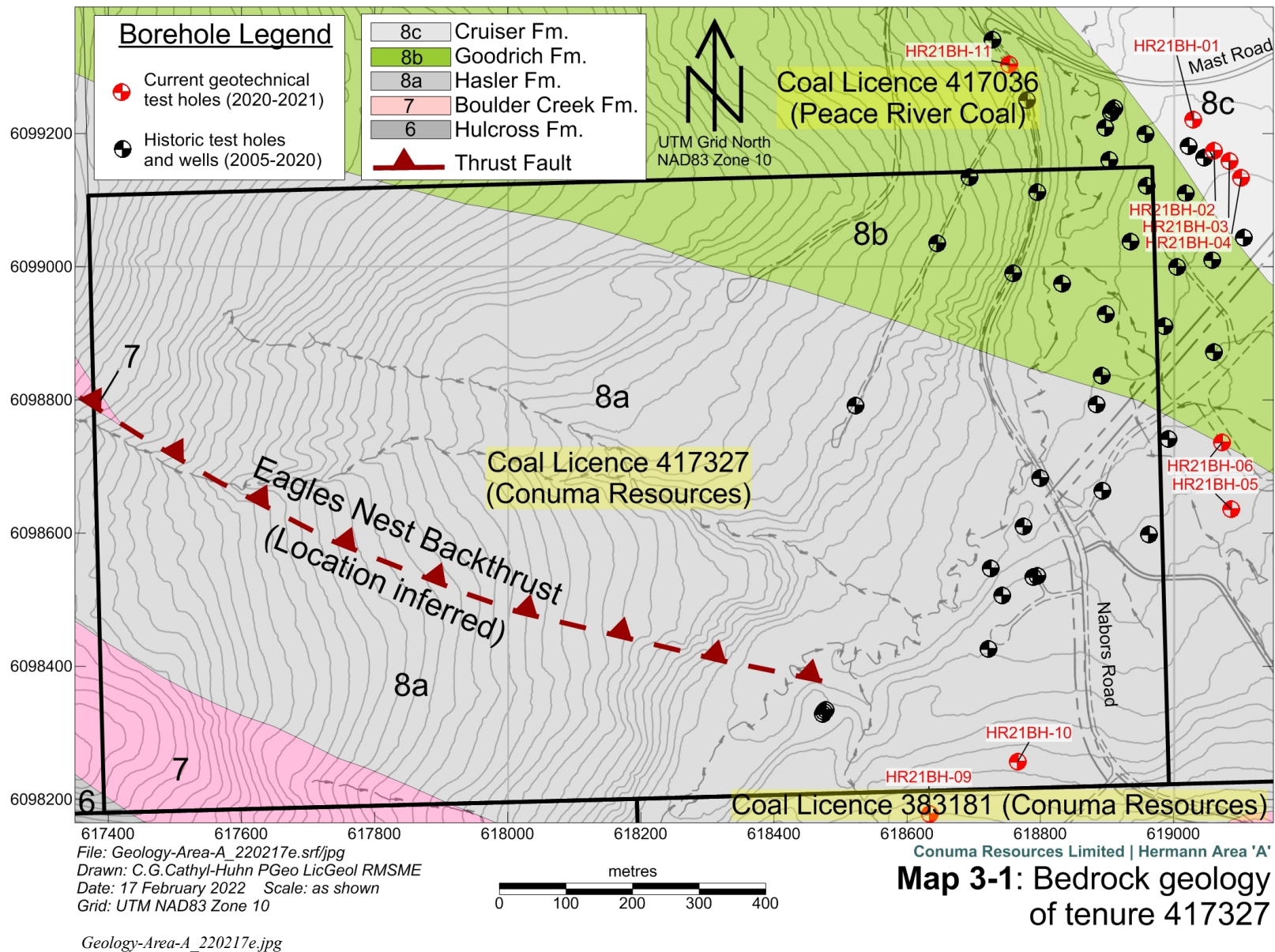
Within the broader Hermann study area (Cathyl-Huhn, 2019), mine waste (map-unit 'M') is associated with the abandoned open-pit workings of the Quintette mines. Mine waste does not extend to within Area 'A' of the Hermann property.

Within Area 'A' (coal licence 417327) and extending off-tenure into adjoining portions of coal licence 417306, silty gravels are present along some roads and forestry trails. These deposits are interpreted to be constructed fills, emplaced to raise the level of roads and trails. Fill deposits are not separately-mapped in **Map 2-4** and **Map 3-1**, as they are of limited and narrow extent.

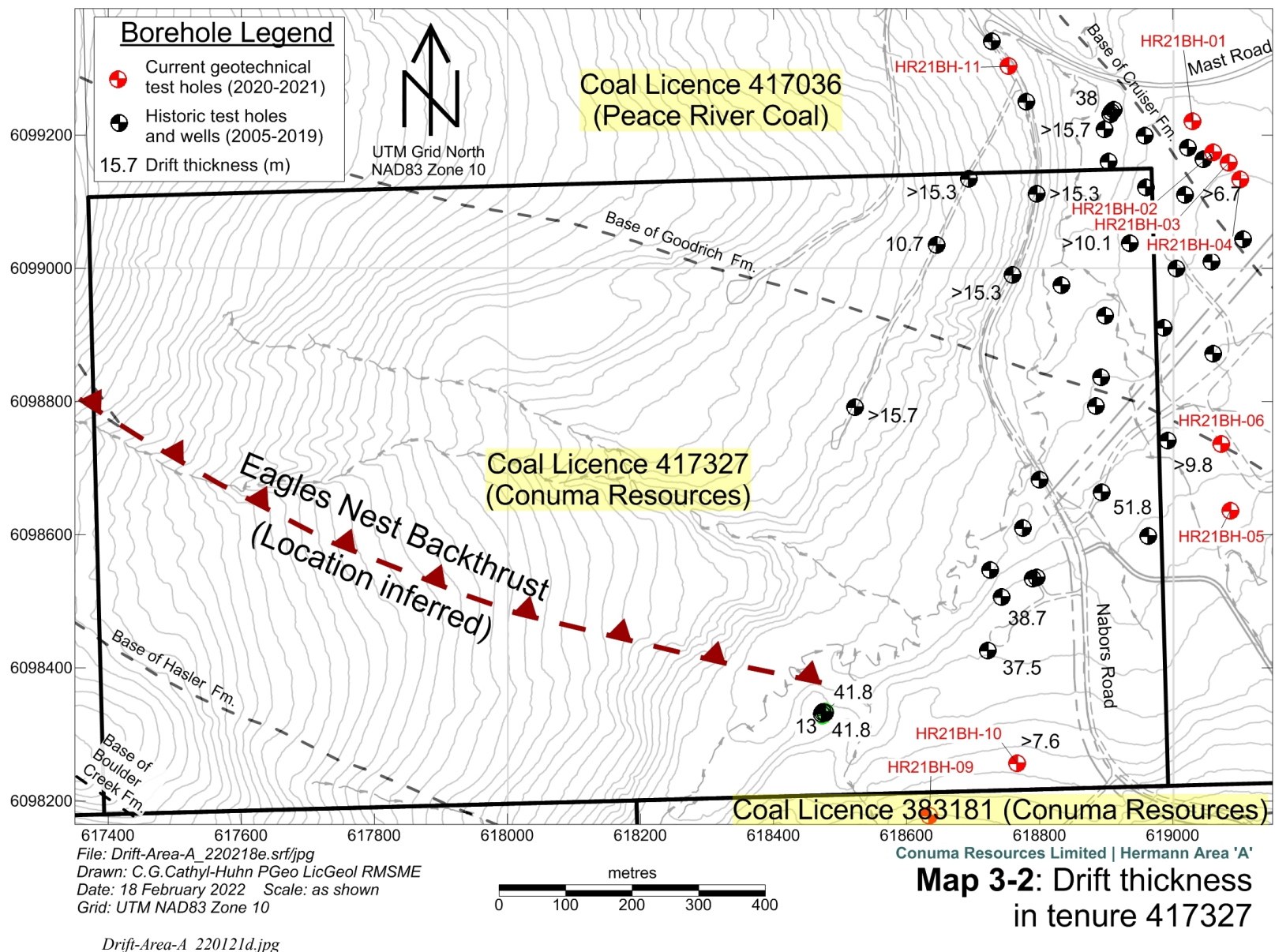
##### **3.3.1.2 Quaternary surficial deposits (map-unit D)**

Unconsolidated surficial deposits of Quaternary age within Area 'A' of the Hermann property comprise valley-bottom and hillside Drift (map-unit D).

The flat-bottomed floor of M20 Creek's valley is occupied by the creek's braidplain, and by adjoining alluvial fans of tributary creeks which drain nearby upland areas. The banks of the creek, where exposed by channel-migration processes, show crudely-bedded silts, sands and gravels which are interpreted as fluvial deposits. Drilling within Area 'A' indicates that glacial and glaciolacustrine sediments, of broadly Pleistocene age, underlie the near-surface fluvial deposits.







**Table 3-1:** Table of formations for Hermann property including Area 'A'

Geological Age		Lithostratigraphic Units				Thickness	Map-Units	Coal Beds/Coal Zones	
		Group	Formation	Member	Division			Bed	Zone
Quaternary			Mine waste			>50 m?	M		
			Drift			nil to 80 m	D		
Early Cretaceous	Late Albian	Shaftesbury Fm.	Cruiser Fm.			>30 m?	8c		
			Goodrich Fm.			50 m?	8b		
			Hasler Fm.			150 m?	8a		
	Late Middle Albian to Late Albian	Boulder Creek Fm.	Paddy Mb.			130 m	7	V coal zone	
			Walton Creek Mb.						
			Cadotte Mb.						
	Middle Albian	Hulcross Fm.			105 m	6	(numerous ash bands)		
	Late Early Albian	Fort St. John Gp.	Gates Fm.	Notikewin Mb.		90 to 115 m	5c	A coal bed	
								B coal bed	
								C coal bed	
				Falher Mb.		70 to 90 m	5b	D coal bed	
								E1-E3 coals	E
								E4 coal bed	
								F1 coal bed	F
								F2/G1 coal bed	
								G2 coal bed	G
								G3 coal bed	
								J1 coal bed	J
								J2 coal bed	
J3 coal bed									
K1-K3 coals								K	
Torrens Mb.				Upper Quintette sandstone	25 to 32 m	5a	L coal bed near base (L ash band)		
				medial siltstone	15 to 18 m				
				Lower Quintette sandstone	35 m				
Moosebar Fm.			Spieker Mb.		49 to 55 m	4	4c		
			Cowmoose Mb.		60 to 70 m		4b		
			Green Marker (informal)		0.1 to 17 m		4a		
Hauterivian to Late Early Albian	Bull-head Gp.	Gething Fm.	Chamberlain Mb.		30 to 40 m	3d	Bird coal zone		
							Skeeter – Chamberlain coal zone		
			Bullmoose Mb.		25 to 35 m	3c			
			Bluesky Mb.		nil to 15 m	3b			
		Gaylard Mb.		150 to 160 m	3a	Gething (Middle/Lower) coal zone(s)			
Barremian		Cadomin Fm.			30 to 85 m	2			
Valanginian and older?	Minne s Gp.	Monach Fm. (and older formations below)			1300 to 1400 m	1	Coals present		

Thickness of the valley-filling Drift, where drilled within Area 'A', ranges from a few metres to at least 51.8 metres. The base of the valley-fill has often been unreachable by drilling, owing to refusal of penetration atop cobbles or boulders.

Outline of the mapped Drift (as depicted in **Map 2-4**) is set at inferred 20-metre depth to bedrock, consistent with Walter Energy's and Conuma's previous mapping.

### **3.3.2 Fort St. John Group (Early Cretaceous)**

An incomplete section of the upper Fort St. John Group is present within and adjoining Area 'A', owing to the group's top contact having been stripped off by erosion during Tertiary uplift of the rocks, and by subsequent scouring by glaciers during the Quaternary era. From top down, the Group's following formations are inferred to form bedrock within and adjacent to Area 'A':

- Cruiser Formation -- ca. 30 m of shale and siltstone (incomplete owing to erosion);
- Goodrich Formation -- 50 m of sandstone and siltstone;
- Hasler Formation -- 150 m of shale and siltstone;
- Boulder Creek Formation -- 130 m of sandstone, conglomerate, shale, and minor coal; and
- Hulcross Formation -- 105 m of shale, siltstone, sandstone, and minor tuff; overlies coal-measures of Gates Formation's Notikewin and Falher members.

Thicknesses and lithologies of the Cruiser, Goodrich, and Hasler formations are known mainly from Stott's examination of outcrop sections situated beyond the boundaries of the broader Hermann property, augmented by partial information concerning their drilled thicknesses in nearby properties.

The Cruiser, Goodrich and Hasler formations are considered by Stott (1968) to be lateral equivalents of the Shaftesbury Formation of the Alberta Syncline, where the Goodrich sandstone is not recognisable within a thick sequence of fine-grained rocks. During the Denison-Quintette era of exploration at Hermann, coal-company geologists did not recognise the tripartite division of the strata overlying the Boulder Creek Formation, and thus they mapped these rocks as Shaftesbury.

#### **3.3.2.1 Cruiser Formation (map-unit 8c)**

The Cruiser Formation is the uppermost formation within the Fort St. John Group. The Cruiser is reported by Stott (1968) to comprise 105 metres of dark grey mudstone with frequent interbeds of siltstone and occasional interbeds of fine-grained, silty sandstone. Bands of discoidal to spheroidal sideritic concretions occasionally occur. The formation's age, on the basis of marine fossils, ranges from Late Albian to Cenomanian.

Within and adjoining Area 'A' of the Hermann coal property, only the basal 30 metres or so of the Cruiser Formation is inferred to have been preserved from erosion; this part of the formation is therefore noted to be of Late Albian age in **Table 3-1**. The basal contact of the Cruiser Formation with the underlying Goodrich Formation is abrupt (Stott, 1968), and possibly disconformable.

#### **3.3.2.2 Goodrich Formation (map-unit 8b)**

The Goodrich Formation is reported (Stott, 1968) to comprise approximately 50 metres of

medium- to thick-bedded, locally cliff-forming sandstone, with frequent interbeds of siltstone and mudstone. In the general vicinity of Hermann Area 'A', the Goodrich Formation contains a southeastward-increasing proportion of siltstone and mudstone bands, such that the formation becomes unmappable on the eastern side of Murray River. No coal is known from the Goodrich Formation at Area 'A', nor within the surrounding area, and none is expected to be subsequently discovered by deeper drilling, on account of the marine origin of the formation's rocks.

The Goodrich is of Late Albian age, as established by its molluscan fauna (Stott, 1968). The basal contact of the Goodrich Formation with the underlying Hasler Formation is gradational.

#### 3.3.2.3 Hasler Formation (map-unit 8a)

The Hasler Formation (Stott, 1968) comprises approximately 150 metres of dark grey, locally rusty-weathering mudstone with frequent interbeds of siltstone and occasional interbeds of fine-grained, silty sandstone. The Hasler is assumed to be of Late Albian age, on the basis of the probable Late Albian age assigned to the underlying Boulder Creek Formation (Gibson, 1992). The abrupt base of the Hasler Formation is locally marked by a thin (a few centimetres to decimetres) layer of pebbly mud-matrix conglomerate.

#### 3.3.2.4 Boulder Creek Formation (map-unit 7)

The Boulder Creek Formation comprises 130 metres of ridge-forming, competent, thick-bedded to massive, coarse-grained sandstone and conglomerate, with thin interbeds of siltstone, variably-carbonaceous mudstone and occasional thin (a few decimetres to a metre) coal beds, locally recognised as the V coal zone.

Gibson (*op. cit.*) recognised three members within the Boulder Creek Formation, on the basis of lithostratigraphy. From top down these are the Paddy, Walton Creek, and Cadotte members. Although this subdivision can be readily mapped on the basis of the Paddy and Cadotte being ridge-formers in higher-elevation portions of the Hermann coal property, such a distinction is not practicable within the more-subdued lower-elevation topography of Area 'A'. **Maps 2-4** and **3-1** therefore depict the Boulder Creek Formation as undivided. Gibson (1992) assigned a probable Late Albian age to the formation.

#### 3.3.2.5 Hulcross Formation (map-unit 6)

The Hulcross Formation, of Middle Albian age within the Early Cretaceous (Stelck and Leckie, 1988; Gibson, 1992b) comprises 105 metres of thinly-interbedded, locally-concretionary medium grey siltstone, fine-grained sandstone and dark grey mudstone with occasional very thin but extremely-persistent interbeds of soft, light grey to white, tuffaceous volcanic ash. Some of the ash bands locally manifest as harder, medium grey claystones, which are more difficult to recognise in the absence of gamma-ray observations.

The Hulcross ash bands are potentially planes of weakness within the strata, and therefore of interest in rock-mechanics studies. The ash bands, as well, provide a means of discerning fault offsets within the formation.

Mesoscale (a few decimetres to a few metres thick) fining-upward sequences reminiscent of proximate turbidites or tempestites are common within the Hulcross, as are trace-fossils and poorly-preserved shell fossils. Fine-grained pyrite is locally-abundant within the Hulcross rocks. The disconformable base of the Hulcross Formation is characteristically marked by a thin (generally a few decimetres, and rarely up to a metre or so thick) erosive-based bed of

cherty pebbly sandstone or gritstone.

### 3.3.3 Older rocks

Rock-units older than the Hulcross Formation are not interpreted to subcrop at rockhead within Area 'A', being inferred to be present only at depth. Refer to **Table 3-1** and **Map 2-4** for details of these units' thickness and distribution.

## **4 Coal resources and coal reserves**

### **4.1 Historic estimates**

No historic resource or reserve estimates have been done within Area 'A'.

### **4.2 Current estimates**

No current resource or reserve estimates have been done for Area 'A'.

## **5 Coal quality**

No coal quality data are available for Area 'A', owing to lack of sufficiently-deep drilling to reach the coal-measures of the Boulder Creek Formation, nor the Gates Formation.

## 6 Reclamation

Within the Hermann 'A' area (coal licence 417327) -- including the area of off-tenure work within coal licence 417036, and within Conuma's Hermann Area 'C' licence 383181 -- drilling of geotechnical testholes and installation of piezometers was conducted in late winter, such that the major site concern was dealing with the accumulation of drifted snow.

Extensive use was made of pre-existing drill trails (from the preceding 2019-2020 work term), and of logging roads and trails previously built by Canfor.

With the exception of those drill trails and pads required for ongoing access to hydrological wells, drill trails and pads have been reclaimed by scattering of appropriately-bucked woody debris and/or wood mulch. Seeding with appropriate native species was done on drill pads and trails.



## 7 Statement of estimated costs

The exploration costs shown below in **Tables 7-1** through **7-4** are a minimum estimate. For purposes of comparison, British Columbia average unit costs are presented at the bottom line of the table.

The following major contractors serviced the work programme:

- 4Evergreen Resources LP -- Road and trail maintenance, and First Aid services, chargeable at half-time from February 2<sup>nd</sup> dayshift through February 7<sup>th</sup> dayshift;
- APEX Geoscience -- project management, chargeable at half-time from February 2<sup>nd</sup> dayshift through February 7<sup>th</sup> dayshift;
- Ecofor -- environmental monitoring, chargeable at half-time from February 2<sup>nd</sup> dayshift through February 7<sup>th</sup> dayshift;
- Geotech Drilling Services Ltd. -- ODEX drilling of geotechnical testholes; and
- Wood Environment & Infrastructure Solutions -- technical supervision of geotechnical boreholes; chargeable from February 1<sup>st</sup> dayshift through February 7<sup>th</sup> dayshift;

Purchase order accruals for drilling and support services were checked for late billings up to a cutoff date of March 8, 2021. Costs presented in the following tables are therefore estimated, and likely to be incomplete owing to scarcity of tenure-based cost details.

Costs are allocated amongst the three tenures, on the basis of how many metres were drilled:

- 417327 (Hermann Area 'A'): 1 hole, 7.6 metres, thus allocated 8.2% of programme cost;
- 383181 (Hermann Area 'C'): 3 holes, 15.5 metres, thus allocated 16.7 % of programme cost; and
- 417036 (PRC land): 7 holes, 69.7 metres, thus allocated 75.1 % of programme cost.

Of these three tenures, only the costs and statistics (given in **Table 7-4**) pertaining to tenure 417327 are reported in this report's statistical front-pages,

**Table 7-1: Estimated cost breakdown for HR21BH-series drilling (2020-2021 term), on tenures 383181, 417036, and 417327**

Year	Boreholes in HR21BH-series	Number of holes	Meterages		Estimated drilling costs		Estimated non-drilling costs					Totals
			ODEX drilling [Geotech]	Sonic drilling	ODEX drilling	Sonic drilling	Geophysical logging	Coal analyses	Catwork (incl. snow clearing and First Aid	Personnel (geological, geotechnical, and eco- logical, supervision)	Well com- ponents / instruments	
2020- 2021		11 holes	92.8 m	nil	\$38,925.44	\$nil	\$nil	\$nil	\$6057.50	\$15,745.33	n/a/	\$60,728.47
			combined 92.8 m									
2020- 2021	as above	11 holes	Meterages		unit costs per metre of drilling							
			92.8 m	nil	\$419.45/m	\$nil	\$nil	\$nil	\$65.27/m	\$169.67/m	n/a	\$654.40/m
			combined 92.8 m									
British Columbia average unit costs per metre, for comparison			n/a	n/a	\$201.53/m	n/a	\$17.56/m	n/a	\$23.30/m	\$20.49/m	n/a	n/a

**Table 7-2: Estimated cost breakdown for HR21BH-series drilling (2020-2021 term), on tenure 383181 (Hermann Area 'C')**

Year	Boreholes in HR21BH- series	Number of holes	Meterages		Estimated drilling costs (proportioned as shown)		Estimated non-drilling costs (proportioned on metreage basis at 16.7%)					Totals
			ODEX drilling [Geotech]	Sonic drilling	ODEX drilling (proportioned at 16.7%)	Sonic drilling	Geophysical logging	Coal analyses	Catwork (incl. snow clearing, layout, and rig mats)	Personnel (geological super- vision by contractors)	Well components / instruments	
2020- 2021		3 holes	15.5 m	nil	\$6500.55	\$nil	\$nil	\$nil	\$1011.60	\$2629.47	n/a	\$10141.62
			combined 15.5 m									
2020- 2021	as above	3 holes	Meterages		unit costs per metre of drilling							
			15.5 m	nil	\$419.45/m	\$nil	\$nil	\$nil	\$65.27/m	\$169.67/m	n/a	\$654.40/m
			combined 15.5 m									
British Columbia average unit costs per metre, for comparison			n/a	n/a	\$201.53/m	\$210.34/m	\$17.56/m	n/a	\$23.30/m	\$20.49/m	n/a	n/a

**Table 7-3: Estimated cost breakdown for HR21BH-series drilling (2020-2021 term), on tenure 417036 (Peace River Coal)**

Year	Boreholes in HR21BH-series	Number of holes	Meterages		Estimated drilling costs (proportioned as shown)		Estimated non-drilling costs (proportioned on metreage basis at 75.1%)					Totals
			ODEX drilling [Geotech]	Sonic drilling	ODEX drilling (proportioned at 75.1%)	Sonic drilling	Geophysical logging	Coal analyses	Catwork (incl. snow clearing, layout, and rig mats)	Personnel (geological super-  vision by contractors	Well components / instruments	
			69.7 m	nil	\$29,233.01	\$nil	\$nil	\$nil	\$4,549.18	\$11,824.74	n/a	
combined 69.7 m		\$45,606.93										
2020- 2021	as above	7 holes	Meterages		unit costs per metre of drilling							
			69.7 m	nil	\$419.45/m	\$nil	\$nil	\$nil	\$65.27/m	\$169.67/m	n/a	\$654.40/m
			combined 69.7 m									
British Columbia average unit costs per metre, for comparison			n/a	n/a	\$201.53/m	\$210.34/m	\$17.56/m	n/a	\$23.30/m	\$20.49/m	n/a	n/a

**Table 7-4: Estimated cost breakdown for HR21BH-series drilling (2020-2021 term), on tenure 417327 (Hermann Area 'A')**

Year	Boreholes in HR21BH-series	Number of holes	Meterages		Estimated drilling costs (proportioned as shown)		Estimated non-drilling costs (proportioned on metreage basis at 8.2%)					Totals
			ODEX drilling [Geotech]	Sonic drilling	ODEX drilling (proportioned at 8.2%)	Sonic drilling	Geophysical logging	Coal analyses	Catwork (incl. snow clearing, layout, and rig mats)	Personnel (geological super-  vision by contractors	Well components / instruments	
			7.6 m	nil	\$3,191.89	\$nil	\$nil	\$nil	\$496.72	\$1291.12	n/a	
combined 7.6 m		\$4,979.73										
2020- 2021	as above	1 hole	Meterages		unit costs per metre of drilling							
			7.6 m	nil	\$419.45/m	\$nil	\$nil	\$nil	\$65.27/m	\$169.67/m	n/a	\$654.40/m
			combined 7.6 m									
British Columbia average unit costs per metre, for comparison			n/a	n/a	\$201.53/m	\$210.34/m	\$17.56/m	n/a	\$23.30/m	\$20.49/m	n/a	n/a

**Note:** costs given in these tables are estimated on the basis of potentially-incomplete invoicing, and should be regarded as minimum values.

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## 9 Conclusions and recommendations

### 9.1 Conclusions

Geotechnical and hydrogeological boreholes drilled during the 2020-2021 work term, at and adjacent to Hermann Area 'A', did not encounter workable coal. The boreholes did, however, provide additional information about the nature and thickness of Drift deposits, thus supporting design of structural and water-management facility foundations.

Area 'A' (tenure 417327) and its immediate vicinity are pervasively covered by thick deposits of unconsolidated and semi-consolidated Drift, locally more than 50 metres thick. Most boreholes did not reach rockhead, and of those which did, none reached potentially-workable coal-measures.

- Although 11 boreholes were drilled at and near Hermann Area 'A' during the 2020-2021 work term, physical work on tenure 417327 (Area 'A'), comprised only one borehole (**Table 7-4**) with an overall depth of 7.6 metres, at an estimated cost of \$4,975.73 (Canadian).
- Physical work on adjoining tenure 417036 (held by Peace River coal, and so not included in this report's statistical cover-sheets) comprised an additional 7 boreholes (**Table 7-3**) with an overall depth of 69.7 metres, at an estimated additional cost of \$45,609.93 (Canadian).
- The remaining three boreholes (**Table 7-2**) were drilled within Conuma's tenure 383181, within Area 'C' of the Hermann property, and have been accounted-for in Coal Assessment Report 1075.

### 9.2 Recommendation

Continued maintenance of tenure 417327 in 'good standing' under the *Coal Act* (through payment of rentals and submission of work reports) is essential to ongoing operations, including the construction of the Hermann open-pit's ancillary facilities. The next upcoming coal assessment reporting date is April 25th, 2022 (for Tenure 417327).

Deep step-out exploratory drilling is recommended for tenure 417327, as part of a regional-scale exploration programme. These drill sites have already been permitted, although the work permits may have timed-out. These boreholes would allow better definition of geological structure and coal-zone geometry within the northwestern portion of the Hermann property, and support definition of potential open-pit boundaries.

## 10 Statement of qualifications

**I, C.G. Cathyl-Huhn P.Geo.(BC) Lic.Geol.(WA) RMSME, do hereby certify that:**

- a) I am currently employed on a full-time basis as Chief Geologist, by Conuma Resources Limited, in their Canadian head office in Tumbler Ridge, British Columbia.
- b) This certificate applies to the current report, *Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia*, dated February 18, 2022.
- c) I am a member (Professional Geoscientist, Licence No.20550) of the Association of Professional Engineers and Geoscientists of British Columbia, licensed as a geologist (Licence No.2089) in Washington State, a Life Member of the Canadian Institute of Mining and Metallurgy, and a founding Registered Member of the Society for Mining, Metallurgy and Exploration (SME, Registered Member No.518350). I have worked as a colliery geologist in several countries for over 43 years since my graduation from the University of British Columbia.
- d) I certify that by reason of my education, affiliation with professional associations, and past relevant work experience, having written numerous published and private geological reports and technical papers concerning coalfield geology, coal-mining geology and coal-resource estimation, that I am qualified as a Qualified Person as defined by Canadian *National Instrument 43-101* and a Competent Person as defined by the Australian *JORC Code*.
- e) I have worked as Chief Geologist for Conuma Coal Resources Limited and Conuma Resources Limited since September of 2016.
- f) My most recent visit to Area 'A' of the Hermann coal property was in July of 2021.
- g) I am the sole author of this report, titled *Coal Assessment Report for the Hermann Area 'A' coal property, British Columbia*, dated February 18, 2022, concerning tenure 417327 within Area 'A' of the Hermann coal property.
- h) I accept professional responsibility for this report.
- i) As of the date of this report, I am not independent of Conuma Resources Limited, pursuant to the tests in Section 1.4 of *National Instrument 43-101*, for the reason that I am a full-time employee of Conuma Resources Limited.
- j) The effective date of this report is April 25, 2021. Work here-reported was done during the 2020-2021 work term, with anniversary date of April 25, 2021.

“original signed and sealed by”

Dated this 18th day of February, 2022.

C.G. Cathyl-Huhn P.Geo. Lic.Geol. RMSME



## Appendix A: Details of testholes and wells

Following are positional and construction details (**Table A-1**), and geological details (**Table A-2**) of Drift thickness, rockhead elevation (where reached) and reported bedrock geology, of geotechnical testholes (TH-series), hydrogeological monitoring wells (MW-series) and groundwater extraction wells (EW-series).

Depths, thicknesses, and elevations are given in metres. **Table A-1** further presents the names of drilling contractors for each testhole or well.

All testholes and wells were set-up to be vertical; azimuth is thus reported as 0 degrees and dip as -90 degrees. Downhole surveys of deviation and verticality were not run.

All surface positions of testholes and wells were surveyed, with coordinates reported in terms of Zone 10 (northern hemisphere) of the Universal Transverse Mercator system, relative to the North American Datum of 1983. Elevations reported are for the ground surface, in metres above geodetic datum. Some locations are only given to the nearest metre.

In the tables, 'Drift' refers to unconsolidated and semi-consolidated sedimentary deposits, such as sand, gravel, silt, peat, or (in some cases along roads and trails) artificial fill. 'Rockhead elevation' refers to the interpreted elevation of rock beneath Drift. Lithology of rock is as reported on graphic logs of testholes and wells. In some cases, only unspecified 'bedrock' is mentioned. No coal was reported from any of the testholes or wells here-discussed.

### A.1: Summary of drilling programme

During the 2020-2021 work term, shallow geotechnical drilling programme within and adjoining Area 'A' of the Hermann coal property, 11 test holes were drilled for geotechnical studies in support of construction design. Two of these test holes were completed as piezometer installations. Of these boreholes, one was drilled within Conuma's Hermann (Area 'A') coal licence 417327, three were drilled within Conuma's Hermann (Area 'C') coal licence 383181, and the remaining seven were drilled within Peace River Coal's coal licence 417036.

Locations (including tabulation of the tenures upon which the holes were drilled) and construction details of these boreholes are presented in **Table A-1**. Details of Drift thickness, as well as depth and reported nature of bedrock, are presented in **Table A-2**.

### A.2 Geophysical logging

Geophysical logging was not done during the shallow 2020-2021 geotechnical drilling within and adjacent to Area 'A' of the Hermann coal property.

### A.3 Compilation and presentation of drill logs

Drill logs were compiled by engineers and technicians working for Wood PLC, a geotechnical consulting firm. Logs have been compiled as single- or multi-page strip logs, as presented within **Appendix B**.



**Borehole / well inventory -- Table A-1**

Programme	Test hole	UTM NAD83 Zone 10		Elevation	TD	Diameter	Contractor	Drilling method	Geophysics	Azimuth	Dip	Commenced	Completed	Tenure	Domain
		Easting	Northing												
NOW-2	HR21BH-01	619029.64	6099220.63	1177.48	10.5	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 2	2021 Feb 2	417036	PRC land
NOW-2	HR21BH-02	619060.84	6099173.8	1179.25	10.5	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 2	2021 Feb 2	417036	PRC land
NOW-2	HR21BH-03	619083.73	6099158.19	1179.62	12.0	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 2	2021 Feb 3	417036	PRC land
NOW-2	HR21BH-04	619101.41	6099133.14	1180.05	10.1	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 3	2021 Feb 3	417036	PRC land
NOW-2	HR21BH-05	619086.54	6098636.25	1192.68	9.0	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 3	2021 Feb 4	417036	PRC land
NOW-2	HR21BH-06	619073.19	6098736.31	1186.48	8.8	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 4	2021 Feb 4	417036	PRC land
NOW-2	HR21BH-07	618963.8	6098021.58	1274.32	4.0	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 4	2021 Feb 4	383181	Area C
NOW-2	HR21BH-08	618724.13	6097983.2	1268.78	2.4	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 5	2021 Feb 5	383181	Area C
NOW-2	HR21BH-09	618634.35	6098178.08	1229.61	9.1	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 6	2021 Feb 6	383181	Area C
NOW-2	HR21BH-10	618765.87	6098256.76	1217.24	7.6	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 6	2021 Feb 6	417327	Area A
NOW-2	HR21BH-11	618753.1	6099303.63	1185.49	8.8	not recorded	Geotech	ODEX	logs not run	0	-90	2021 Feb 6	2021 Feb 6	417036	PRC land

Geological results of drilling -- **Table A-2**

Test hole	UTM NAD83 Zone 10		Elevation	TD	Drift thick- ness	Rockhead elevation	Lithology of bedrock	Piezometer in- stalled	Commenced	Completed	Tenure
	Easting	Northing									
HR21BH-01	619029.64	6099220.63	1177.48	10.5	>10.5	not reached	not reached	no	2021 Feb 2	2021 Feb 2	417036
HR21BH-02	619060.84	6099173.8	1179.25	10.5	>10.5	not reached	not reached	no	2021 Feb 2	2021 Feb 2	417036
HR21BH-03	619083.73	6099158.19	1179.62	12.0	>12.0	not reached	not reached	no	2021 Feb 2	2021 Feb 3	417036
HR21BH-04	619101.41	6099133.14	1180.05	10.1	>10.1	not reached	not reached	no	2021 Feb 3	2021 Feb 3	417036
HR21BH-05	619086.54	6098636.25	1192.68	9.0	>9.0	not reached	not reached	yes	2021 Feb 3	2021 Feb 4	417036
HR21BH-06	619073.19	6098736.31	1186.48	8.8	>8.8	not reached	not reached	yes	2021 Feb 4	2021 Feb 4	417036
HR21BH-07	618963.8	6098021.58	1274.32	4.0	0.6	1273.72	bedrock [no details given]	no	2021 Feb 4	2021 Feb 4	383181
HR21BH-08	618724.13	6097983.2	1268.78	2.4	0.9	1267.88	siltstone and sandstone, light grey	no	2021 Feb 5	2021 Feb 5	383181
HR21BH-09	618634.35	6098178.08	1229.61	9.1	>9.1	not reached	not reached	no	2021 Feb 6	2021 Feb 6	383181
HR21BH-10	618765.87	6098256.76	1217.24	7.6	>7.6	not reached	not reached	no	2021 Feb 6	2021 Feb 6	417327
HR21BH-11	618753.1	6099303.63	1185.49	8.8	>8.8	not reached	not reached	no	2021 Feb 6	2021 Feb 6	417036

## Appendix B: Graphic drill logs

Following in the printed version of this report are copies of the graphic logs of the eleven year-2021 test holes in the HR21BH-series, drilled during the month of February. Locations, dates, elevations, and tenures for each test hole are presented above in Table A-2, and in abbreviated form on the logs themselves.

In the digital copy of this report, PDF-formatted scans of the graphic logs are presented in the following file:

- HR21BH-series test holes: filename *Scan-Area-A-logs-BH21s-1.pdf*