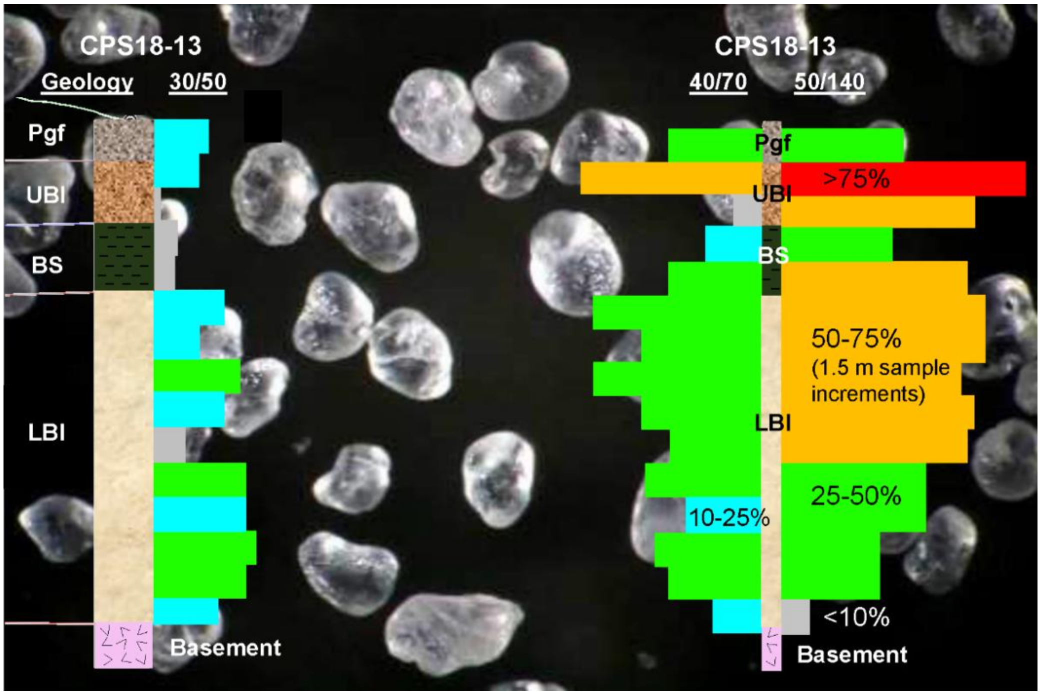
NI 43-101 TECHNICAL REPORT,

UPDATED 2020 PRELIMINARY FEASIBILITY STUDY ON CANADIAN PREMIUM SAND INC.'S WANIPIGOW SILICA SAND DEPOSIT IN MANITOBA, CANADA



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1 Summary

1.1 Issuer and Purpose

This updated 2020 Preliminary Feasibility Study has been commissioned by, and completed for, Canadian Premium Sand Inc. (CPS, or the Company); a publicly traded company with its corporate headquarters in Calgary, AB, Canada. CPS is proposing to explore and develop a high-grade silica sand extraction project in southeastern Manitoba, Canada. CPS's flagship sand project is called the Wanipigow Sand Project and is being explored as a source of silica sand for use in a variety of markets such as tight oil and gas hydraulic fracturing operations and the glass manufacturing industry.

The Wanipigow silica sand is hosted within a mature, well-rounded and quartzose sand-dominated portion of the Ordovician Winnipeg Formation of the Western Canada Sedimentary Basin. During 2019, resource/reserved estimations as part of a Preliminary Feasibility Study were completed by the same authorship group as the authors of this report.

Since the 2019 Technical Report, the Wanipigow Property's land position has changed due to a Government of Manitoba decision that the Province maintains a single Quarry Lease for municipal aggregate use (note: This lease may potentially be made available for silica sand extraction once the surficial aggregate is depleted). Quarry Lease 2925 was originally considered as a CPS pending lease application, and subsequently, the subsurface sand underlying the lease was included in the 2019 resource/reserve estimations. In this Technical Report, the sand resource underlying Quarry Lease 2925 has been removed from the updated 2020 resource/reserve estimations.

In addition, CPS has enacted an updated 2020 mine plan that constitutes a change in the transportation protocol and the location of the dry processing facility for sand extracted from the Wanipigow Sand Project. That is, instead of trucking the finished sand product from the Wanipigow mine site to railhead in southern Manitoba, the new mine production plan is to barge wet processed sand from the mine site to a laydown and dry plant facility with rail transport access located approximately 92 km south of the mine site near the Rural Municipality of St. Andrews, MB. The finished product can then be loaded directly onto a short line railroad that connects with the Canadian Pacific (CP) and Canadian National (CN) railroads in Winnipeg, MB.

In accordance with the revised mine plan, CPS has completed a capital optimization review that has identified opportunities to lower the revised capital and operating cost estimates for the Project (Canadian Premium Sand Inc., 2020).

Accordingly, the intent of this Technical Report is to provide updated 2020 resource/reserve estimations and economic valuations based on the new resource area, revised mine plan and results of the capital optimization review. This updated 2020 Preliminary Feasibility Study replaces and supersedes the 2019 Technical Report.

1.2 Authors

This Technical Report was prepared by APEX Geoscience Ltd. (APEX) and John T. Boyd Company (BOYD) for CPS. APEX authors include Roy Eccles, M.Sc. P. Geol. and Rachelle Hough, B.Sc. P. Geo. Mr. Eccles prepared Sections 1-14, 20 and 23-27, and supervised the preparation of, and is responsible for, the overall publication of this updated 2020 Preliminary Feasibility Study. Mr. Eccles and Ms. Hough are Qualified Persons as defined by the CSA's NI 43-101 and have been involved in mineral exploration, and mineral resource modelling and estimations for greenfield and brownfield silica sand deposits and operations in western Canada and northeastern United States.

BOYD authors include Robert Farmer, B.Sc., P. Eng. and Mike Wick, MBA, PE. These authors prepared the 'mining sections' in this Technical Report (Sections 15-19 and 21-22). Mr. Farmer and Mr. Wick are Qualified Persons as defined by the CSA's NI 43-101 and are experienced mining engineers with extensive knowledge in industrial (including silica sand) and metallic mineral underground and surface mine design, production scheduling and financial modeling.

1.3 Property Location and Description

The Wanipigow Sand Project is located approximately 160 km northeast of the City of Winnipeg, Manitoba, within the jurisdictional boundaries of the Incorporated Community of Seymourville and is adjacent to the Hollow Water First Nation's reserve lands. Additionally, a portion of the Property occurs within the jurisdictional boundaries of the Community of Manigotagan. The Project is also located approximately 67 km north of the Town of Powerview-Pine Falls.

The Wanipigow Property consists of 41 contiguous Quarry Leases that grant CPS the exclusive right to mine quarry minerals on the Property. The area encompasses 2,147.87 hectares (5,307.50 acres). CPS owns 100% of the legal interests in all 41 Quarry Leases, and its interests are fully registered.

The area of mineral resource reported in this Technical Report occurs within a smaller subset of 22 Quarry Leases within the Wanipigow Property.

The Property can be accessed by Provincial paved and all-weather gravel roads. There is no rail line access to the Property and CPS is exploring the option of barging wet sand product to a dry processing plant location with an adjacent rail transload or depot center.

With respect to the location of the proposed dry processing plant – no formal location has been announced by CPS. CPS is in negotiations with private landowner(s) in the Rural Municipality of St. Andrews, MB (southwest corner of Lake Winnipeg). CPS proposes to locate the site adjacent to the Lake Line Railroad, which operates a Shortline Railway between Gimli and Selkirk, MB. The Lake Line Railroad interchanges with the CP and CN railways in Selkirk, MB

1.4 Royalties and Economic Participation Agreements

CPS has entered into Economic Participation Agreements with Hollow Water First Nation and the Incorporated Community of Seymourville. CPS has also entered into various contractual agreements relating to the acquisition of title of 18 quarry leases that included advance and future royalty payments.

These Royalty and Economic Participation Agreements commit the Company to quarterly payments once production commences, totaling $3.30 per tonne silica sand sold as fracture proppant, $2.80 per tonne of silica sand sold and $0.50 per tonne of construction aggregates sold. There is a further royalty payment of $1.00 per tonne of silica sand sold as fracture proppant, $0.50 per tonne of silica sand sold and $0.50 per tonne for construction aggregates sold relating to tonnes mined and sold specifically related to the quarry leases acquired from Gossan Resources Limited.

1.5 Environmental Act Licence

The Project requires a licence issued by Manitoba, pursuant to *The Environment Act* (C.C.S.M. c. E125), which applies across all phases of the project, from the earliest build phases to decommissioning

On May 16, 2019, the Company was issued the necessary environmental licence for the Wanipigow Sand Project: Environment Act Licence No. 3285 (EA Licence), subject to commercially reasonable terms and conditions. A copy of Licence No. 3285 can be found at https://www.gov.mb.ca/sd/eal/registries/5991wanipigow/index.html.

The EA Licence contains a set of general terms and conditions that are intended to provide implementation guidance and to ensure the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans.

1.6 Conditional Use Order

As the Project substantially falls within the jurisdictional boundaries of The Incorporated Community of Seymourville, the Company was required to submit an application to the Incorporated Community of Seymourville, to utilize lands that are zoned "natural areas", under applicable Zoning and Development Plan By-laws, for the purpose of harvesting silica sand and other ancillary commercial purposes. The Company made the required Conditional Use Application, and a hearing on its application was held on May 3, 2019.

On May 9, 2019, the Incorporated Community of Seymourville issued a Conditional Use Order to the Company, approving the conditional use of lands within its jurisdictional boundaries for a silica sand extraction operation, including accessory uses, building and structures.

1.7 Influence of Updated Mine Plan on Licencing and the Conditional Use Order

Because the updated mine plan constitutes a change in the mode of sand transportation and includes plans to construct a dry processing plant at a new location, CPS will be required to submit:

- A notice of alteration to the issued Environmental Act Licence;
- An amended Conditional Use Order application; and
- New applications to the Canada Department of Fisheries and Ocean and Transport Canada.

1.8 Community Consultation

Potential operations associated with the Wanipigow Sand Project are anticipated to be a substantial benefit to the Local and Regional Project Area communities in terms of training, employment, and potential business opportunities related to the services that will be required for the Project.

CPS has conducted its own extensive public engagement that has resulted in letters of support for the Project from local communities, including the Incorporated Communities of Seymourville, the Community of Manigotagan, the Northern Affairs Settlement of Aghaming and Hollow Water First Nation. CPS now has Participation Agreements in place with Hollow Water First Nation and the Incorporated Community of Seymourville.

1.9 Property-Related Risks and Uncertainties

The business of exploration for, and development of, silica sand involves a high degree of risk and there can be no assurance that the current program will result in profitable operations. The Company's continued existence is dependent upon the preservation of its interest in the underlying properties, the discovery of economically recoverable resources/reserves, the achievement of profitable operations, and the ability of the Company to raise additional financing, if necessary, or alternatively upon the Company's ability to dispose of its interests on an advantageous basis.

Ownership in mineral properties involves certain risks due to the difficulties in determining the validity of certain leases and the potential for problems arising from the ambiguous conveyance history characteristics of many mining interests.

Additionally, the land parcel near the Rural Municipality of St. Andrews, MB where the planned sand receiving dock, dry process plant and rail loadout are proposed to be located, are not yet under CPS control. Although securing this parcel of land is not expected to be an issue, another similar parcel (with similar economics) has been located as an alternative.

1.10 History

The Ordovician Winnipeg Formation contains the largest known deposits of high-quality silica sand in Manitoba. Silica sand was reportedly first discovered in Manitoba in 1859, prior to being formerly documented in 1900. The Wanipigow Property area – and immediate Property area – has undergone numerous exploration programs conducted by the Government of Manitoba and by Industry. The first claims for silica sand were staked on Black Island, which is located approximately 5 km west of the Wanipigow Property, in 1910 and the silica sand production occurred on and off between 1929 and 2003 for use as feedstock to manufacture glass, fibreglass, foundry sand and silica sand for hydraulic fracturing in the oil and gas industry. The authors have been unable to verify the information presented in this historical off-Property section, and therefore, the reader should be aware that the information is not necessarily indicative of the mineralization on the Wanipigow Property.

1.11 Canadian Premium Sand Inc. 2018 Exploration

In September 2018, CPS commissioned: 1) Boart Longyear of Calgary, AB as a third-party drill contractor; and 2) APEX Geoscience Ltd. to provide independent geological and geotechnical support related to a 93-drillhole program to test and delineate the Wanipigow Silica Sand Project. The drill program was initiated on September 27, 2018 and completed on December 13, 2018. A total of 1,573.7 m of drilling was completed.

All drillholes were drilled using a sonic drill to obtain core from surface collar through the entire targeted Winnipeg Formation and terminated in Precambrian Basement. The holes were drilled vertically at Azimuth 0° and dip -90°. The drilling pattern was orientated in a grid pattern and spaced 400 m apart. Infill drilling was periodically conducted at a drillhole spacing of 150 to 200 m. The sonic drill rig was selected to maintain core consistency and overall, the drill program sampling achieved a 94% core recovery rate.

Based on drill logs, lithological observations and grain size particle distributions, the current study subdivides the Winnipeg Formation into four distinguishable subunits that include from stratigraphic base to top: Lower Black Island (LBI); Black Shale (BS); Upper Black Island (UBI); and Pleistocene glaciofluvial (Pgf).

A total of 761 samples were collected during the 2018 drill program. The samples were collected in 1.5 m increments; occasionally, it was necessary to shorten or lengthen the channel sample length based on lithological changes. CPS and the company's independent geological consultants conducted a variety of analytical test work and Quality Assurance – Quality Control testing consistent with the standard silica sand, or proppant, analytical procedures.

All 761 samples were analyzed for particle grain size distributions which are reported in a series mesh-size. These data were used to create an ‘assay’ database that was utilized in the resource/reserve estimations presented in this Technical Report. Over 675 sample fractions were selected for proppant characterization test work, including: Krumbein shape factor (roundness and sphericity), crush resistance tests, acid solubility and turbidity. The sand gradation and proppant characterization analytical work were conducted by Turnkey Processing Solutions LLC in Ottawa, IL, Stim-Lab Inc. in Duncan, OK and Lonquist Frac Sand Services in Edmonton, AB. The analytical work was reviewed and approved by certified Professional Engineers that cite recognized ASTM specifications pursuant to ISO 13503-2 for laboratory preparation, analysis and reporting.

1.12 Qualified Professional Site Inspection

All report authors (and QPs) conducted a team-based site inspection on March 4-6, 2019. The authorship team visited select drill sites and participated in an active backhoe trench site to view the Pgf and UBI geological units. In addition, archived drill samples were reviewed enabling verification of the BS and LBI units (which were not obtainable using a backhoe). Technical meetings held during the site inspection discussed all aspects of the Wanipigow Sand Project.

Ms. Hough P. Geo. was on site for CPS’s 2018 Wanipigow drill program (September 27 to December 12, 2018) and can confirm that material change occurred at the Wanipigow Sand Project in the form of a 93-hole drill program. Ms. Hough coordinated core logging, core sampling and data acquisition associated with the drill program and can therefore verify that all aspects of the 2018 exploration program were properly and independently surveyed, measured and recorded.

1.13 Mineral Processing and Proppant Quality

CPS has conducted an above normal amount of proppant characterization work. The proppant test work results show the Lower and Upper Black Island Member silica sand generally satisfies the recommendations set forth in International Standards ISO 13503-2:2006/Amd.1:2009E for sieve size fractions, sphericity, roundness, acid solubility and turbidity and crush classification. This means the silica sand meets the measurement specifications for use in hydraulic fracturing operations.

The Pleistocene glaciofluvial sand at the Wanipigow Sand Project is of lower quality than the LBI or UBI sand. During the drilling program, subsequent core logging, and interpretation of the proppant test work results, however, it was observed that the Wanipigow Property includes surficial deposits that are characterized by reworked Winnipeg Formation bedrock silica sand. The Pgf is not exclusively classified as waste material, therefore, and: 1) portions of the Pgf sand have ISO/API test results that assimilate reworked UBI; and/or 2) the Pgf geo-unit could be used for specific fracking applications or upgraded via processing to higher levels of proppant classification.

1.14 Reasonable Prospects

CPS's 2018 exploration program and analytical work has enabled the QP's to develop a high level of confidence in the project via drill and data density, analytical work that relate to the specifications of the product and identification of the market and the factors that influence market demand and the potential for success in the market. Industry standard tests were conducted on silica sand from the Wanipigow Sand Project and the sand meets the ISO 13503-2 quality specifications for proppant product. It is a reasonable estimate by the QP that the tonnage and quality of the Wanipigow sand can be estimated to within close limits and that variation from the estimate would not significantly affect potential viability of the deposit.

Lastly, the project is situated in a location such that it can be classified as a regional or In-Basin sand capable of providing proximal silica sand to massive tight oil and gas projects in the Duvernay and Montney fields in the WCSB and Bakken fields in North Dakota, U.S. It is the senior author's opinion, therefore, that the Wanipigow Sand Project sand has reasonable prospect for potential economic extraction.

1.15 Mineral Resource Estimation

The 3-D geological model utilized information from 93 vertical drillholes to define Pgf, UBI, BS and LBI geological units and 744 gradation analysis that form the 'assay' file used to calculate the Wanipigow Property Silica Sand Resource Estimate. The Wanipigow Property Silica Sand Resource Estimate includes the Pgf, UBI, and the LBI. The interstitial BS was examined only to calculate an estimate of the volumes/tonnages of waste material situated within the resource. The resource is calculated using a block model with a size of 20 by 20 m in the horizontal directions and 2 m in the vertical direction. Ordinary Kriging (OK) was used to estimate the size fraction values at each parent block that lies within the Pgf, UBI, and LBI wireframe.

The Wanipigow Property Silica Sand Resource Estimate has been classified by the senior author and QP in accordance with guidelines established by the CIM "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" dated November 29th, 2019, and the CIM "Definition Standards for Mineral Resources and Mineral Reserves" amended and adopted May 10th, 2014.

The authors have a high level of confidence in, and understanding of, the geology and quality of the LBI geo-unit and have classified the LBI as a Measured Resource. There is a lower confidence level of the LBI resource at the margins of the drillhole density, or when the unit boundary cannot be determined to the same degree as within the measured resource area, and therefore, portions of LBI have lower classification levels such, the LBI is reported as both Measured and Indicated Resources.

The UBI geo-unit is less prevalent than the LBI in the Wanipigow Sand Project area. The lower boundary between the UBI and the underlying BS is well defined, however, the upper UBI boundary with Pgf is less certain and may be intercalated in places. The UBI has similar, if not better, Krumbein shape factor and crush resistance test results than the LBI geo-unit but has not undergone the same degree of proppant characterization test work as the LBI. Accordingly, the UBI resource classification is capped as an Indicated Resource with UBI areas of less certainty being classified as Inferred Resources.

A large portion of Pgf samples were collected and evaluated as part of CPS's 2018 exploration work, the results of which conclusively show that the Pgf sand does not have the same quality as the LBI/UBI. Having said this, the CPS 2018 drill program core logging exhibited areas in which the Pgf unit might have included exfoliated and/or reworked UBI bedrock sandstone. These localized areas could have some consideration as potential sources of silica sand. As such, it is possible that the Pgf is not exclusively classified as waste material and the authors have assigned an Inferred Resource to the Pgf with the understanding that additional work is required to understand the spatial and processing parameters of the Pgf prior to advancing the geo-units classification level.

Nominal *in-situ* sand bulk densities of 1.897 g/cm^3, 1.911 g/cm^3, and 1.878 g/cm^3 were applied to Pgf, UBI, and LBI, respectively. The density values are based on 58 representative loose bulk density samples collected during the 2018 drill program and include 13 Pgf, 3 UBI, 6 BS, and 36 LBI samples. The loose bulk densities were converted to an *in-situ* bulk density by using a bulking factor of 30%.

The Wanipigow Property estimation of the individual size fractions is completed and reported using a lower cutoff of mesh-sizes that are greater than or equal to 20-mesh and less than or equal to 140-mesh fraction (i.e., the +20 and -140 size fractions are discarded from the estimation process).

Mineral resources are not mineral reserves and do not have demonstrated economic viability. This Wanipigow Property Silica Sand Resource Estimate predicts the following total (i.e., global) resources:

- Lower Black Island Measured & Indicated Resources of 39.2 million tonnes;
- Upper Black Island Indicated Resource of 3.1 million tonnes and Inferred Resource of 1.7 million tonnes; and
- Pleistocene glaciofluvial Inferred Resource of 93.0 million tonnes (Tables 1.1 and 1.2).

With respect to unequivocal waste rock, the black shale geo-unit overlying the LBI resource has an estimated volume of 920,000 m^3 for a total weight of 1.7 million metric tonnes. The density of the BS was taken from compacted *in-situ* material bulk density tests on 6 samples that average 1.814 g/cm^3.

Table 1.1 The Wanipigow Silica Sand Measured and Indicated Resource Estimates reported for the UBI and LBI sandstone geo-units as a total (global) volume and tonnage (the total Measured & Indicated resources are presented in the grey highlighted bold text). Selected proppant size fraction distributions of 20/40, 30/50, 40/70, 50/140 and 70/140 mesh are also shown.

		Volume (m^3)			Tonnes (1000 kg)			Tons (907.2 kg)		
Classification	**Size Fraction**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**
Measured	**20/40**	/	/	3,600,000	/	/	6,800,000	/	/	7,500,000
	30/50	/	/	5,600,000	/	/	10,500,000	/	/	11,600,000
	40/70	/	/	7,700,000	/	/	14,500,000	/	/	16,000,000
	50/140	/	/	12,000,000	/	/	22,500,000	/	/	24,900,000
	70/140	/	/	7,500,000	/	/	14,200,000	/	/	15,600,000
Measured Total		/	/	18,900,000	/	/	35,500,000	/	/	39,100,000
Indicated	**20/40**	/	100,000	400,000	/	300,000	700,000	/	300,000	800,000
	30/50	/	300,000	600,000	/	600,000	1,100,000	/	700,000	1,200,000
	40/70	/	700,000	800,000	/	1,300,000	1,500,000	/	1,400,000	1,600,000
	50/140	/	1,200,000	1,200,000	/	2,400,000	2,300,000	/	2,600,000	2,500,000
	70/140	/	800,000	800,000	/	1,500,000	1,400,000	/	1,700,000	1,600,000
Indicated Total		/	1,600,000	1,900,000	/	3,100,000	3,700,000	/	3,400,000	4,000,000
M&I Total		**/**	**1,600,000**	**20,900,000**	**/**	**3,100,000**	**39,200,000**	**/**	**3,400,000**	**43,200,000**

Note 1: Mineral resources are not mineral reserves and do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.

Note 2: The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).

Note 3: Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 100,000 unit).

Note 4: The product size fractions overlap and are not cumulative.

Note 5: The 'Total' (global) volume and weights are estimated on a global basis and represent the main Measured & Indicated LBI and UBI Silica Sand Resource.

Note 6: The Wanipigow estimation of the individual sieve size fractions was completed and reported using a lower cutoff of mesh-sizes that are greater to or equal to 20-mesh and less than or equal to 140-mesh fraction.

Note 7: *In-situ* compacted bulk densities used include: Pgf: 1.90 g/cm^3; UBI: 1.91 g/cm^3; LBI: 1.88 g/cm^3. Bulk densities are utilized to convert volume (cubic metres) to tonnages.

Table 1.2 The Wanipigow Property Silica Sand Inferred Resource Estimates reported for the Pgf and UBI sandstone geo-units as a total (global) volume and tonnage (grey highlighted bold text). Selected proppant size fraction distributions of 20/40, 30/50, 40/70, 50/140 and 70/140 mesh are also shown.

		Volume (m^3)			Tonnes (1000 kg)			Tons (907.2 kg)		
Classification	**Size Fraction**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**
Inferred	**20/40**	9,800,000	100,000	/	18,700,000	200,000	/	20,600,000	300,000	/
	30/50	12,400,000	200,000	/	23,400,000	400,000	/	25,800,000	400,000	/
	40/70	15,700,000	300,000	/	29,800,000	600,000	/	32,800,000	700,000	/
	50/140	32,300,000	700,000	/	61,300,000	1,300,000	/	67,600,000	1,400,000	/
	70/140	23,500,000	400,000	/	44,600,000	900,000	/	49,200,000	900,000	/
Inferred Total		**49,000,000**	**900,000**	**/**	**93,000,000**	**1,700,000**	**/**	**102,600,000**	**1,900,000**	**/**

Note 1: Mineral resources are not mineral reserves and do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.
Note 2: The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).
Note 3: Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 100,000 unit).
Note 4: The product size fractions overlap and are not cumulative.
Note 5: The 'Total' (global) volume and weights are estimated on a global basis and represent the main Inferred Pgf and UBI Silica Sand Resource.
Note 6: The Wanipigow estimation of the individual sieve size fractions was completed and reported using a lower cutoff of mesh-sizes that are greater to or equal to 20-mesh and less than or equal to 140-mesh fraction.
Note 7: *In-situ* compacted bulk densities used include: Pgf: 1.90 g/cm^3; UBI: 1.91 g/cm^3; LBI: 1.88 g/cm^3. Bulk densities are utilized to convert volume (cubic metres) to tonnages.

1.16 Mineral Reserve Estimation

The QP's for the estimation of the Mineral Reserve was Mr. Robert J. Farmer, P. Eng. and Mr. Michael F. Wick P. Eng., Vice President's with BOYD. The estimates reported herein are a reasonable representation of the Mineral Reserves within the Project at the current level of analysis, which is consistent with industry standards for a Preliminary Feasibility Study.

The Mineral Reserve was derived from the Measured and Indicated Mineral Resource estimates and represents the portion of the Mineral Resource that has been converted to a Mineral Reserve through the application of appropriate Modifying Factors to potential mining volumes created during the mine design and planning process.

No external dilution was applied. Internal dilution consists of the +20 and -140 size fractions as interpolated in the Mineral Resource block model. Mining losses of 5% represent Mineral Resources not extracted due to operational constraints typically encountered during routine mining operations. The remaining 95% represents the material that will be extracted and sent for further processing (i.e. plant feed).

In this study, a Mineral Reserve is defined as the Measured and Indicated Mineral Resource that would be extracted by the mine design and which can then be processed and sold at a profit. The Measured resources meeting that standard are herein classified as Proven mineral reserves, while the Indicated resources meeting that standard are classified as Probable mineral reserves.

The mineral reserves are expressed as saleable product tonnage estimates of Proven & Probable reserves totalling 24.1 million tonnes comprised of: 21.3 million tonnes of LBI and 2.8 million tonnes of UBI (Table 1.3).

The results of the economic analysis to support Mineral Reserves represent forward looking information that is subject to several known and unknown risks, uncertainties, and other factors that may cause actual results to differ materially from those presented here. The Mineral Reserves estimated for the Wanipigow Silica Sand Project are subject to the types of risks common to most silica sand quarry operations that exist in Canada.

Uncertainty that may materially impact mineral reserve estimation include but are not limited to: site-specific mining and geological conditions, management and personnel capabilities, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, unforeseen changes in legislation and new industry developments.

Table 1.3 Wanipigow Mineral Reserve Estimates.

		Tonnes (1000 kg)			Tons (907.2 kg)		
Classification	**Size fraction**	**UBI**	**LBI**	**UBI + LBI**	**UBI**	**LBI**	**UBI + LBI**
Proven	**20/40**	/	3,444,000	3,444,000	/	3,796,000	3,796,000
	40/70	/	8,300,000	8,300,000	/	9,149,000	9,149,000
	70/140	/	8,166,000	8,166,000	/	9,001,000	9,001,000
	Proven Total	**/**	**19,910,000**	**19,910,000**	**/**	**21,946,000**	**21,946,000**
Probable	**20/40**	261,000	282,000	543,000	288,000	311,000	599,000
	40/70	1,173,000	525,000	1,698,000	1,293,000	579,000	1,872,000
	70/140	1,354,000	595,000	1,949,000	1,493,000	656,000	2,149,000
	Probable Total	**2,788,000**	**1,402,000**	**4,190,000**	**3,074,000**	**1,546,000**	**4,620,000**
	Proven + Probable	**2,788,000**	**21,312,000**	**24,100,000**	**3,074,000**	**23,492,000**	**26,566,000**

Note 1: The Mineral Reserve is expressed as saleable product tonnages.
Note 2: The Qualified Person (QP) responsible for the Mineral Reserve estimate is Mr. Robert J. Farmer, P.Eng., and Mr. Michael F. Wick, P. Eng., Vice President's of John T. Boyd Company
Note 3: The Effective Date of the Mineral Reserve estimates is 19 March 2020.
Note 4: The Mineral Reserve has been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum (CIM) definitions, as required under NI 43-101.
Note 5: The Mineral Reserve is a subset of, not additive to, the Mineral Resource and is quoted on a 100% project basis.
Note 6: The Mineral Reserve may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.
Note 7: Tonnages are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).

1.17 Mining Methods

The planned Wanipigow Silica Sand Project is projected to include a conventional, open pit quarry employing typical truck-and-excavator mining operations. The quarry and wet process plant are planned to operate 20 hours per day, 7 days per week, 212 days per year (weather permitting) and is expected to extract approximately 1.8 million tonnes of raw sand per year at full production. The dry process plant and rail loadout will operate continuously 365 days per year.

At this mining rate, the operation will produce an average of 1.3 million product tonnes per year after processing losses. The quarrying and processing operations are planned to be in full production one year after start-up. The mine life is projected to be at least 20 years after which an estimated 33.9 million tonnes of raw sand and 9.9 million bank cubic metres (bcm) of waste materials will have been mined.

Development of the quarry is scheduled to begin in 2022. In commercial mining terms, the planned quantities of overburden waste and sand to be mined each year for the Wanipigow Silica Sand Project are considered modest.

1.18 Economic Analysis

The capital expenditure estimate for the CPS fully enclosed wet and dry plant, loadout and related infrastructure is approximately CDN$124 million, with a contingency of approximately CDN$10 million. The total capital expenditure and lease-related costs are estimated at CDN$250 to CDN$255 million for life-of-mine plan. Operating costs are discussed for the first five years and are found to be reasonable and appropriate for a Preliminary Feasibility Study.

The Canadian Premium Sand project has an after-tax Net Present Value (NPV) of CDN$290.7 million, discounted at an 8% discount rate (Table 1.4). The after-tax Internal Rate of Return (IRR) is 46.0%. Taxes include federal (15%) and provincial (12%; Manitoba) and assume capital loss carry forward and a tax loss carry forward related to capital expenditures from development of the mine previously incurred and treated as sunk capital for modeling purposes.

Table 1.4 Cash flow analyses.

	$C '000							
Category	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6-10	Years 11-20	Total
Net Revenues at Loadout (RM of St. Andrews)	46,627.8	94,323.5	94,694.3	99,298.8	99,912.1	462,601.8	1,019,505.4	1,916,963.8
Cost of Goods Sold	20,373.8	40,236.8	39,333.5	40,203.0	39,980.2	187,121.8	397,251.0	764,500.1
Capital Expenditures	133,696.8	0.0	0.0	943.6	937.2	4,336.1	7,612.0	147,525.7
Pre-Tax Net Cash Flow	-107,442.8	54,086.7	55,360.9	58,152.1	58,994.8	271,143.9	614,642.4	1,004,938.0
Taxes	0.0	0.0	0.0	11,491.2	15,928.6	73,208.9	165,953.4	266,582.1
After-Tax Net Cash Flow	**-107,442.8**	**54,086.7**	**55,360.9**	**46,660.9**	**43,066.2**	**197,935.0**	**448,688.9**	**738,355.9**

1.19 Concluding Qualified Persons Statement

It is concluded that the work completed in the updated 2020 Preliminary Feasibility Study indicates that the mineral resource and mineral reserve estimates and Project economics are sufficiently defined to indicate that the Wanipigow Sand Project is technically and economically viable.

The updated 2020 Preliminary Feasibility Study represents a key stage in the project design as it lays the foundation for the project work scope carried forward into a Feasibility Study. As such the Qualified Persons consider that the scientific and technical information available on the Wanipigow Sand Project can support proceeding with additional data collection, trade-off and engineering work and preparation of more detailed studies to optimize and achieve a higher level of design and costing accuracy (i.e., Feasibility Study). However, the decision to proceed with additional studies and/or mining operations on the Project is at the discretion of CPS.

1.20 Recommendations

The authors of this Technical Report advise that CPS consider the following work recommendations at the Wanipigow Sand Project with the objectives to:

1. Enhance the economics of the deposit by upgrading inferred resource areas or geo-units to higher levels of resource/reserve classification by way of additional exploratory work;

2. Prepare the silica sand resources/reserves to a feasibility level of mine design and costing accuracy and/or open pit mining and mine production phases at the discretion of CPS;

3. Conduct exploratory work to define the extent of the deposit beyond the current resource/reserve area; and

4. Ongoing environmental management planning, permitting, and social and local community engagement.

The authors perception is that the work objectives are complementary to one another, and therefore, a unified work approach is recommended. The collective estimated cost of the 2020 work recommendations, including a 10% contingency, is CDN$1,859,000. A preliminary cost breakdown is provided in Table 1.5.

Exploration work should include infill drilling/trenching, surficial mapping, electric/radar geophysical surveys and continued proppant characterization test work in the current resource/reserve area to further evaluate the mine plan and upgrade the resource/reserve classification. Similar exploratory level programs should be conducted at the Wanipigow Property to explore the extent of the silica sand deposit (i.e., exploration in those areas outside of the current resource/reserve area).

Table 1.5 Future recommendations for the Wanipigow Sand Project.

Objective	Item	Description	Cost Estimate CDN$	Cost Estimate USD$
Upgrading current resource/reserve classification levels	Infill and geotechnical drilling within the current resource area	Approximate 750 m sonic and auger drill programs to improve geology/resource certainty and to better delineate waste material	$350,000	$262,500
	Surficial mapping and electrical/radar surveys	Surficial mapping, downhole wireline logging and/or Ground Penetrating Radar geophysical surveying to better characterize the shallow and deep subsurface geo-units, respectively (with an emphasis on defining the lithology of the Pgf sub-unit)	$70,000	$52,500
	Proppant characterization test work	Ongoing test work conducted at an independent ISO 13503-2 certified laboratory to further evaluate Winnipeg Formation sand quality	$40,000	$30,000
Feasibility level of mine-planning design and costing accuracy	Detailed mine planning	Detailed mine design/plan; dewatering plan; productivity analysis; and operating costs estimates built from ground up on yearly basis over life-of-mine		
	Product distribution	Further initiatives pertaining to rail served product storage and distribution terminals	$330,000	$330,000
	Technical Reporting	Feasibility Study Technical Report		
	Groundwater monitoring	Ongoing hydrogeological studies and pump tests to assess groundwater conditions	$150,000	$112,500
Definition of deposit extent	Exploratory drilling on the Property outside the current resource area	Approximatel 900 m sonic drill program to delineate other resource areas at the Wanipigow Property	$525,000	$393,750
Environmental, permitting and community engagement	Environmental-planning and continued community consultation	Development of a Closure Plan, environmental plans, permitting, andcontinued social and local community engagement	$225,000	$168,750
	Contingency on exploration work (10%)		$169,000	$126,750
		TOTAL ESTIMATED COST	**$1,859,000**	**$1,476,750**

Currency converted using a conversion of 1 CDN dollar equals 0.75 USD dollar.

Additionally, it is recommended that the project engineering be advanced to a feasibility or detailed design level prior to any production. Mining-related feasibility work would include detailed mine design/plan; dewatering plan; productivity analysis; and operating costs estimates built from ground up on yearly basis over life-of-mine. At this level, additional design and cost details of the process plant and loadout would be compiled. An expansion of the existing mining plan scheduling the sequencing of overburden removal and placement, run-of-mine sand removal, and ongoing reclamation should be included. Haul road placement and grade, traffic flow arrangements, and a detailed and scaled site plan should be finalized. A daily operating plan narrative outlining the maintenance tracking, safety, and product quality assurance and testing programs should be included.

From a product distribution perspective, rail served product storage and distribution terminals within the target markets should be located and discussions regarding securing product unloading, storage, and truck loading should be initiated.

Continued mine development logistical costs should include ongoing monitoring of the groundwater conditions at the Wanipigow Sand Project; preparation of a Closure Plan and environmental plans; finalize permitting and licencing; and ongoing social and local community consultation.

Finally, the decision to put a mineral project into production is the responsibility of the issuer. To reduce this risk and uncertainty, the issuer typically makes its production decision based on a comprehensive Feasibility Study of established mineral reserves. Given this positive Preliminary Feasibility Study of an industrial mineral commodity, it is important to point out that some of the recommendations (e.g., exploratory work beyond the current resource area and/or completion of a formal Feasibility Study in conformance with NI 43-101 and 43-101 CP) are ultimately not required for a production decision. The ultimate demonstration of the economic viability of an industrial mineral deposit may be satisfied by actual profitable production as a function of market conditions such as product specification and demand. If CPS puts the Wanipigow Sand Project into production, and to avoid making misleading disclosure, it is recommended that the issuer discloses that the Company has not based its production decision on a Feasibility Study of mineral reserves demonstrating economic and technical viability and should provide adequate disclosure of the increased uncertainty and the specific economic and technical risks of failure associated with its production decision.

2 Introduction

2.1 Issuer and Purpose

This updated 2020 Preliminary Feasibility Study has been commissioned by, and completed for, Canadian Premium Sand Inc. (CPS, or the Company); a publicly traded company with its corporate headquarters in Calgary, AB, Canada. CPS is proposing to explore and develop a high-grade silica sand extraction project in southeastern Manitoba, Canada. CPS's flagship project is called the Wanipigow Sand Project (or the Project) and is being explored as a potential source of silica sand for use in a variety markets such as tight oil and gas hydraulic fracturing operations and the glass production industry.

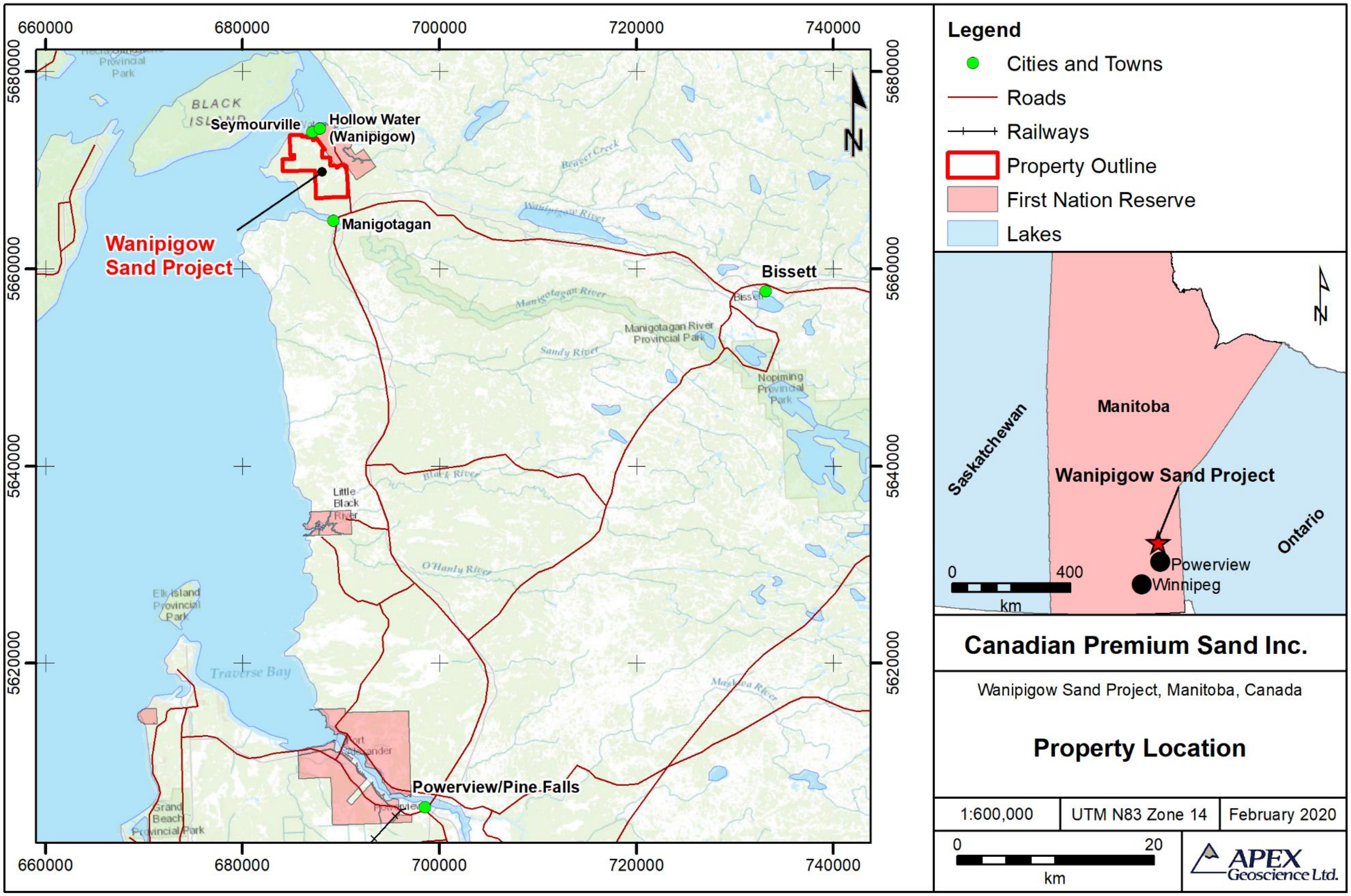
The Wanipigow Sand Project is located approximately 160 km northeast of the City of Winnipeg, Manitoba and approximately 67 km north of the Town of Powerview-Pine Falls (Figure 2.1), within the jurisdictional boundaries of the Incorporated Community of Seymourville and is adjacent to the Hollow Water First Nation's reserve lands. Additionally, a portion of the Property occurs within the jurisdictional boundaries of the Community of Manigotagan. The Wanipigow Property (or the Property) consists of 41 issued, contiguous Quarry Leases that encompass an area of 2,147.87 ha. CPS owns 100% of the legal interests in the Quarry Leases, and its interests are fully registered.

The Wanipigow silica sand is hosted within a mature, well-rounded and quartzose sand-dominated portion of the Ordovician Winnipeg Formation of the Western Canada Sedimentary Basin (WCSB; e.g., Bezys and Conley, 1998). The geological unit was first recognized as a potential source of silica sand at this locale in the early 1900's (Dowling, 1900; Watson, 1985). Historical drill test work was conducted in the Property area between 1981 and 2008 by companies other than CPS and by Claim Post Resources Inc. (now CPS) in 2014.

In September to December 2018, CPS completed a 93-drillhole (1,574 m) program using a sonic drill rig to maximize core return material and maintain core consistency. A total of 763 core samples were collected at 1.5 m intervals to conduct a detailed assessment of the Ordovician Winnipeg Formation for its silica sand, or 'proppant', potential. Based on these data, 2019 resource/reserve estimations and a Preliminary Feasibility Study were prepared by Eccles et al. (2019).

Since the 2019 Preliminary Feasibility Study, the Wanipigow Property's land position has changed due to a Government of Manitoba decision that the Province maintains a single Quarry Lease for municipal aggregate use. Quarry Lease 2925 was originally considered as a CPS pending lease application, and subsequently, the subsurface sand underlying the lease was included in the 2019 resource/reserve estimations of Eccles et al. (2019).

Figure 2.1. General location of Canadian Premium Sand Inc.'s Wanipigow Sand Project in southeastern Manitoba.



In addition, CPS has enacted an updated 2020 mine plan that constitutes a change in the transportation protocol and the location of the dry processing facility for sand extracted from the Wanipigow Sand Project. That is, instead of trucking the finished sand product from the Wanipigow mine site to railhead in southern Manitoba, the new mine production plan is to barge wet processed sand from the mine site to a laydown and dry plant facility with rail transport access located approximately 92 km south of the mine site near the Rural Municipality of St. Andrews, MB. The finished product can then be loaded directly onto a short line railroad that connects with the CP railroad in Winnipeg, MB.

Accordingly, the intent of this Technical Report is to provide updated 2020 resource/reserve estimations and economic valuations based on the new resource area, revised mine plan and results of the capital optimization review. This updated 2020 Preliminary Feasibility Study replaces and supersedes the 2019 Technical Report.

This updated 2020 Preliminary Feasibility Study of the Wanipigow Sand Project was prepared in accordance with the Canadian Securities Administration's (CSA's) National Instrument 43-101 (NI 43-101) with the mineral resource being estimated using the Canadian Institute of Mining and Metallurgy (CIM) *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines*, dated November 29th, 2019, and the CIM *Definition Standards for Mineral Resources and Mineral Reserves*, amended and adopted May 10th, 2014.

2.2 Authors and Site Inspection

This Technical Report was prepared by APEX Geoscience Ltd. (APEX) and John T. Boyd Company on behalf of CPS. The individuals presented in Table 2.1, by their education, experience and professional association, are considered Qualified Persons (QPs) as defined in NI 43-101 for this report. The QPs meet the requirement of independence as defined in NI 43-101.

Table 2.1 Technical Report authors.

Qualified Person	Position	Employer	Independent of CPS	Date of last site visit	Professional designation	Report sections
Roy Eccles	Senior consulting geologist/COO	APEX Geoscience Ltd.	Yes	4-6 March 2019	P. Geol.	1-14; 23-27
Robert Farmer	Vice-President	JT boyd Company	Yes	4-6 March 2019	P. Eng.	1-3; 15-22; 25-27
Michael Wick	Vice-President	JT boyd Company	Yes	4-6 March 2019	P. Eng.	1-3; 15-22; 25-27
Rachelle Haugh	Project geologist	APEX Geoscience Ltd.	Yes	4-6 March 2019	P. Geo.	10, 11, 12 [1]

[1] Under the direct supervision of Mr. Eccles

APEX authors include Roy Eccles, M.Sc. P. Geol. and Rachelle Hough, B.Sc. P. Geo. Mr. Eccles supervised the preparation of, and is responsible for, the publication of this Technical Report and Wanipigow silica sand resource estimate. Mr. Eccles is a Professional Geologist with the Association of Professional Engineers and Geoscientists of Alberta (APEGA), has worked as a geologist for more than 30 years since his graduation from University and has been involved in mineral exploration, and mineral resource modelling and estimations for greenfield and brownfield silica sand deposits and operations in western Canada and northeastern United States.

Mr. Eccles – and all report authors – conducted a site inspection on March 4-6, 2019. The project team visited select drill sites and participated in an active backhoe trench site. This enabled Mr. Eccles to verify – in the field setting -- the Pgf and UBI geological units. In addition, archived drill samples were reviewed enabling the senior author to verify the BS and LBI units (which were not obtainable using a backhoe). The site inspection included a team project meeting in which the authors reviewed all aspects of the Wanipigow Sand Project.

Ms. Hough P. Geo. was on site for CPS's 2018 Wanipigow Sand Project drill program (September 27 to December 12, 2018) and can confirm that material change occurred on the Wanipigow Sand Project during September to December 2018 in the form of a 93-hole drill program. Ms. Hough coordinated core logging, core sampling and data acquisition associated with the drill program and can therefore verify that all aspects of the 2018 exploration program were properly and independently surveyed, measured and recorded. Ms. Hough is a Professional Geologist with APEGA and has over 10 years of experience in mineral exploration ranging from grass roots prospecting to advanced stage drilling on numerous silica sand projects in western Canada.

The resource estimation statistical analysis and three-dimensional modeling was prepared by Mr. Warren Black P. Geo. (under the direct supervision of Mr. Eccles). Mr. Black is APEX' geostatistical specialist and created the three-dimensional model, and conducted statistical analysis, block modelling and the resource estimations. Mr. Eccles has reviewed all resource geological modelling and estimation work and accepts responsibility of the mineral resource presented in Section 14 of this Technical Report.

Mr. Farmer, B.Sc., P. Eng., and Mr. Wick, MBA, PE prepared the mining and economic evaluation sections in this Technical Report (Sections 15 to 19 and 21 and 22). Mr. Farmer is an experienced mining engineer with extensive knowledge in industrial and metallic mineral underground and surface mine design, production scheduling and financial modeling. Mr. Wick has over 34 years of experience in engineering, operations, and management. Background includes industrial minerals, metals, and coal, and all aspects of mining operations including: reserve evaluation and planning, capital budget planning and management, operational efficiency, productivity and utilization management, extensive M&A business (market) development, due diligence, valuation experience, and expert witness experience pertaining to industrial minerals projects worldwide.

2.3 Sources of Information

This Report is a compilation of publicly available information, and information obtained from CPS's 2018 drill program at the Wanipigow Sand Project. References in this Technical Report are made to publicly available reports that were written prior to implementation of NI 43-101, including government geological publications and journal manuscripts available through the Government of Manitoba (GoM) or publishing houses. Government reports and journal articles include those that depict the Winnipeg Formation bedrock stratigraphy and its proppant potential (e.g., Vigrass, 1971; McCabe, 1978; Spiece, 1980; Pearson, 1984; Watson, 1985; Bezys and Conley, 1998; Bamburak, 1996; Bailes and Percival, 2000; Dott, 2003; Kreis, 2004; Matile and Keller, 2004; Dorador et al., 2014; Konstantinou et al., 2014; Lapenskie, 2016).

Miscellaneous industry Assessment File Reports and Company news releases were used to corroborate the stratigraphy and the Property's silica sand potential, and to reference historical mineral exploration work in the general Wanipigow Sand Project area (e.g., Chornoby, 2003; Pedersen, 2007; Cooke, 2008; Cooke, 2010; Canadian Premium Sand Inc., 2013, 2017, 2018a-d, 2020; Havilah Mining Corporation, 2018).

Other professionally prepared reports cited in this Technical Report that pertain directly to CPS's Wanipigow Sand Project include a 2014 NI 43-101 Resource Estimate Technical Report by Puritch et al. (2014) and an Environment Act Proposal prepared by Gifford and Samoiloff (2018). These reports were prepared by professional engineers (P.Eng.) or biologists (P. Biol.) on behalf of CPS and are used for geological and exploration background, and environmental assessment information, in the current report.

The sand gradation and proppant analytical work were conducted by Turnkey Processing Solutions LLC (TPS) in Ottawa, IL, Stim-Lab Inc. (Stim-Lab) in Duncan, OK and Lonquist Frac Sand Services (Lonquist) in Edmonton, AB. The analytical work was reviewed and approved by certified Professional Engineers that cite recognized ASTM specifications pursuant to ISO 13503-2 for laboratory preparation, analysis and reporting.

All reference citation documentation is presented in Section 27, References. The senior author of this Technical Report has reviewed all government and miscellaneous reports. Government reports, journal papers and professional technical or environmental reports were prepared by a person, or persons, holding post-secondary geology or related degrees. Based on review of these documents and/or information, the senior author has deemed that these reports and information, to the best of his knowledge, are valid contributions to this Technical Report, and therefore takes ownership of the ideas and values as they pertain to the current Technical Report.

2.4 Units of Measure

With respect to units of measure, unless otherwise stated, this Technical Report uses:

- Abbreviated shorthand consistent with the International System of Units (International Bureau of Weights and Measures, 2006);

- 'Bulk' weight is presented in metric tonnes (tonnes; 1,000 kg or 2,204.6 lbs.) and United States short tons (tons; 2,000 lbs or 907.2 kg);

- Geographic coordinates are projected in the Universal Transverse Mercator (UTM) system relative to Zone 15 of the North American Datum (NAD) 1983;

- Density is grams/cubic centimetre (g/cm^3);

- Test sieve sizes as outlined in American Society of the International Association for Testing and Materials (ASTM) E11 (ASTM, 1995)

- Proppant specifications of ISO 13503-2:2006/ Amd.1:2009E (International Standards, 2009); and

- Currency in Canadian dollars (CDN$, or C$), unless otherwise specified (e.g., U.S. dollars, US$; Euro dollars, €).

3 Reliance of Other Experts

The authors are not qualified to provide an opinion or comment on issues related to legal agreements, royalties, permitting and environmental matters. Accordingly, the senior author disclaims portions of Section 4, Property Description and Location, in this Technical Report. This limited disclaimer of responsibility includes the following.

- The senior author of this Technical Report has reviewed but is not qualified to legally verify the legal status of the quarry leases discussed in Sections 4.1, and 4.2. Information related to the status of quarry leases was obtained by: 1) verbal communication with CPS and their legal council during the preparation of this Technical Report; 2) Manitoba's Integrated Mining and Quarrying System (iMaQs) at https://web33.gov.mb.ca/imaqs/. CPS and Darla Rettie of Pitblado LLP of Winnipeg, MB provided Quarry Lease status documents on May 23, 2019 and February 5, 2020 from the Manitoba Mines Branch that showed the 41 leases are active, in good standing and owned 100% by CPS as of 19 March 2020.

- The senior author has reviewed but is not qualified to legally verify royalty structures and/or subsequent economic participation agreements that would be enacted in the event the Wanipigow Sand Project was to go into commercial production. A summary of the royalty and economic participation agreement payments was provided by CPS management (Mr. Anshul Vishal) to the authors on March 11, 2020. The information – as discussed in Section 4.5 – was partially verified by reviewing royalty agreements as stated in various CPS News Releases, but overall, the authors is reliant on the information as provided by CPS.

- The senior author relied on documents provided by CPS regarding permitting and environmental status of the Property. This information was provided by CPS to APEX in January 2019 and includes an Environment Act Proposal that was prepared by AECOM Canada Ltd. for CPS (Gifford and Samoiloff, 2018). The authors summary information from this report in Sections 4.6 and 4.7 with respect to environmental matters and potential future permitting. CPS obtained their Environmental Act Licence on May 16, 2019; the terms and conditions therein substantiated the authors understanding of the environmental requirements of the Wanipigow Sand Project. On March 6, 2020 CPS (Mr. Anshul Vishal) indicated the Company will have to apply for an alteration for the EA Licence and Conditional Use Order based on the revised plant design.

4 Property Description and Location

4.1 Location and Description

The Wanipigow Sand Project is located approximately 160 km northeast of the City of Winnipeg, Manitoba (Figure 2.1), within the jurisdictional boundaries of the Incorporated Community of Seymourville and is adjacent to the Hollow Water First Nation's reserve lands. Additionally, a portion of the Property occurs within the jurisdictional boundaries of the Community of Manigotagan. The Project is also located approximately 67 km north of the Town of Powerview-Pine Falls.

The Wanipigow Property is in the National Topographic System 1:50 000 map sheet: 062P-01. The centre of the Property and centre of the mineral resource area are located at approximately:

- 687600 m Easting, 5670650 m Northing, Zone 14, NAD83; and

- 686000 m Easting, 5671950 m Northing, Zone 14, NAD 83, respectively.

The lands on which the Project is situated are owned by the Crown in right of Manitoba (Manitoba). Manitoba has issued CPS a series of 41 contiguous quarry leases ("Quarry Leases") that grant CPS the exclusive right to mine quarry minerals on the Property (Figure 4.1). The legal descriptions of all 41 Quarry Leases is presented in Table 4.1.

The 41 Quarry Leases collectively encompass a contiguous area of 2,147.87 ha (5,307.50 acres; Table 4.1; Figure 4.1). The quarry leases individually range in size from 20.0 to 168.0 acres. CPS owns 100% of the legal interests in all 41 Quarry Leases, and its interests are fully registered.

Figure 4.1 Spatial orientation of issued Quarry Leases at the Wanipigow Sand Project.

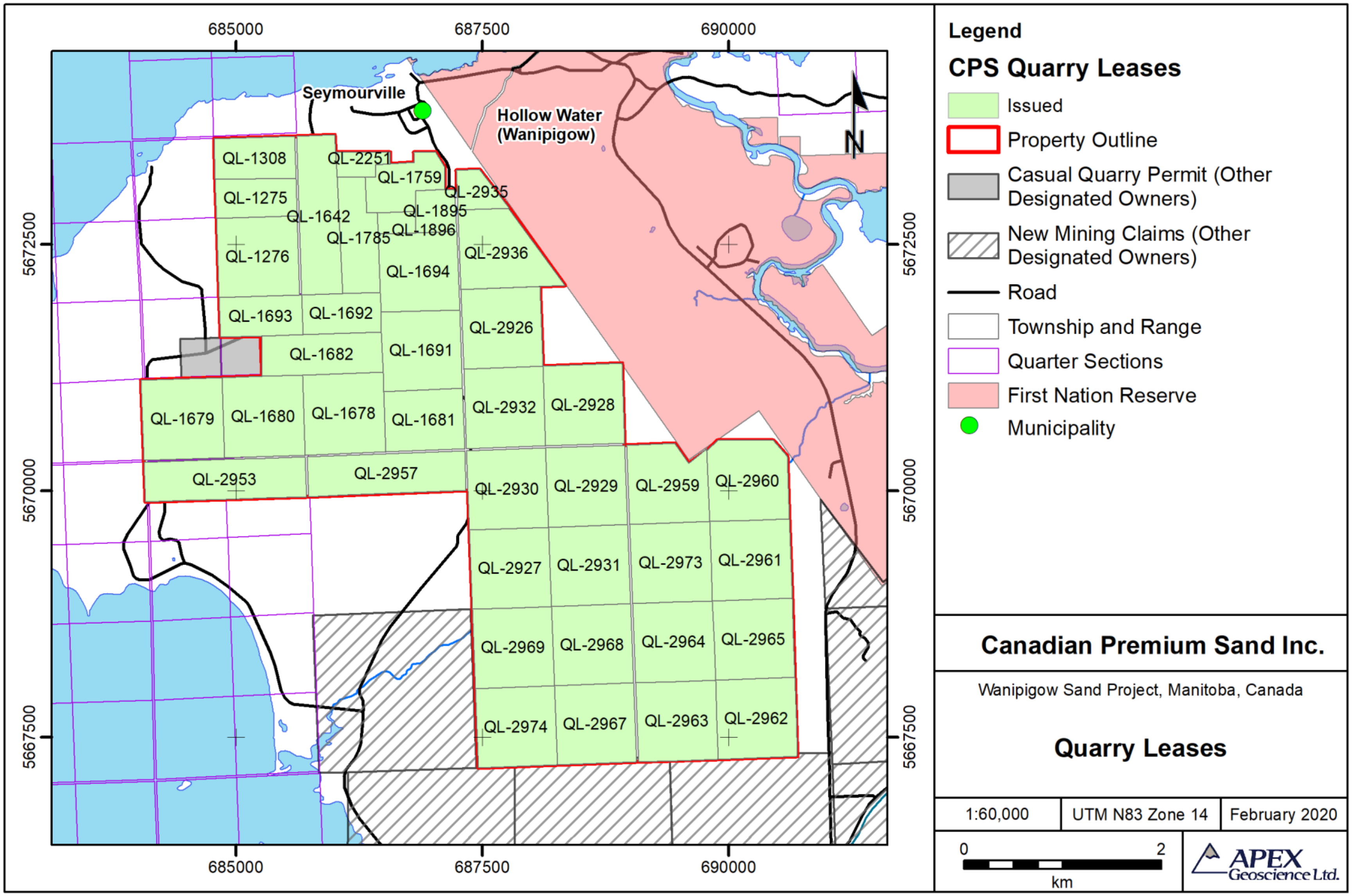


Table 4.1. Description of issued Quarry Leases at the Wanipigow Sand Project. Quarry Leases associated with the mineral resource presented in this Technical Report are highlighted in grey.

Lease Number	Lease Type	Status	Designated Title Holder	Public Land Survey System (section, township, range, meridion)	Area (acres)	Area (hectares)	Issue Date	Expiry Date
QL-1275	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 36 TWP 25 RGE 8 E1	79.99	32.37	1996-07-16	2020-08-15
QL-1276	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 36 TWP 25 RGE 8 E1	160.00	64.75	1996-07-16	2020-08-15
QL-1308	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 36 TWP 25 RGE 8 E1	79.99	32.37	1997-03-03	2020-04-02
QL-1642	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	160.00	64.75	2002-06-26	2020-07-26
QL-1678	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 30 TWP 025 RGE 009 E1	164.00	66.37	2003-06-20	2020-07-20
QL-1679	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 25 TWP 025 RGE 008 E1	154.28	62.44	2003-06-20	2020-07-20
QL-1680	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 25 TWP 025 RGE 008 E1	160.00	64.75	2003-06-20	2020-07-20
QL-1681	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 30 TWP 025 RGE 009 E1	119.99	48.56	2003-06-20	2020-07-20
QL-1682	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 30 TWP 025 RGE 009 E1	122.00	49.37	2003-06-20	2020-07-20
QL-1691	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 30 TWP 25 RGE 9 E1	158.47	64.13	2003-09-24	2020-10-24
QL-1692	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 30 TWP 25 RGE 9 E1	73.83	29.88	2003-09-24	2020-10-24
QL-1693	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 25 TWP 25 RGE 8 E1	77.90	31.53	2003-09-24	2020-10-24
QL-1694	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	152.49	61.71	2003-09-24	2020-10-24
QL-1759	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	87.52	35.42	2004-12-10	2021-01-09
QL-1785	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	110.01	44.52	2005-05-25	2020-06-24
QL-1895	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	26.76	10.83	2007-03-21	2020-04-20
QL-1896	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	20.00	8.09	2007-04-16	2020-05-16
QL-2251	Quarry Lease	Issued	(259535) Canadian Premium Sand	SEC 31 TWP 25 RGE 9 E1	22.49	9.10	2009-10-16	2019-10-16
QL-2926	Quarry Lease	Issued	(259535) Canadian Premium Sand	NW1/4 SEC 29 TWP 025 RGE 009 E1	159.88	64.70	2019-04-30	2020-05-30
QL-2927	Quarry Lease	Issued	(259535) Canadian Premium Sand	SW1/4 SEC 20 TWP 025 RGE 009 E1	159.88	64.70	2019-11-12	2020-12-12
QL-2928	Quarry Lease	Issued	(259535) Canadian Premium Sand	SE1/4 SEC 29 TWP 025 RGE 009 E1	158.64	64.20	2019-11-12	2020-12-12
QL-2929	Quarry Lease	Issued	(259535) Canadian Premium Sand	NE1/4 SEC 20 TWP 025 RGE 009 E1	159.88	64.70	2019-04-30	2020-05-30
QL-2930	Quarry Lease	Issued	(259535) Canadian Premium Sand	NW1/4 SEC 20 TWP 025 RGE 009 E1	159.88	64.70	2019-04-30	2020-05-30
QL-2931	Quarry Lease	Issued	(259535) Canadian Premium Sand	SE1/4 SEC 20 TWP 025 RGE 009 E1	159.88	64.70	2019-11-12	2020-12-12
QL-2932	Quarry Lease	Issued	(259535) Canadian Premium Sand	SW1/4 SEC 29 TWP 025 RGE 009 E1	159.88	64.70	2019-04-30	2020-05-30
QL-2935	Quarry Lease	Issued	(259535) Canadian Premium Sand	LS 12 SEC 32 TWP 025 RGE 009 E1	38.03	15.39	2016-06-16	2020-07-16
QL-2936	Quarry Lease	Issued	(259535) Canadian Premium Sand	LS 2,3,4,5 SEC 32 TWP 025 RGE 009 E1	150.83	61.04	2016-06-16	2020-07-16
QL-2953	Quarry Lease	Issued	(259535) Canadian Premium Sand	LS 13,14,15,16 SEC 24 TWP 025 RGE 008 E1	36.79	14.89	2019-04-30	2020-05-30
QL-2957	Quarry Lease	Issued	(259535) Canadian Premium Sand	LS 13,14,15,16 SEC 19 TWP 025 RGE 009 E1	159.14	64.40	2019-04-30	2020-05-30
QL-2959	Quarry Lease	Issued	(259535) Canadian Premium Sand	NW1/4 SEC 21 TWP 025 RGE 009 E1	151.77	61.42	2019-04-30	2020-05-30
QL-2960	Quarry Lease	Issued	(259535) Canadian Premium Sand	NE1/4 SEC 21 TWP 025 RGE 009 E1	154.44	62.50	2019-11-12	2020-12-12
QL-2961	Quarry Lease	Issued	(259535) Canadian Premium Sand	SE1/4 SEC 21 TWP 025 RGE 009 E1	159.63	64.60	2019-11-12	2020-12-12
QL-2962	Quarry Lease	Issued	(259535) Canadian Premium Sand	SE1/4 SEC 16 TWP 025 RGE 009 E1	160.12	64.80	2019-11-12	2020-12-12
QL-2963	Quarry Lease	Issued	(259535) Canadian Premium Sand	SW1/4 SEC 16 TWP 025 RGE 009 E1	158.64	64.20	2019-11-12	2020-12-12
QL-2964	Quarry Lease	Issued	(259535) Canadian Premium Sand	NW1/4 SEC 16 TWP 025 RGE 009 E1	159.63	64.60	2019-11-12	2020-12-12
QL-2965	Quarry Lease	Issued	(259535) Canadian Premium Sand	NE1/4 SEC 16 TWP 025 RGE 009 E1	158.89	64.30	2019-11-12	2020-12-12
QL-2967	Quarry Lease	Issued	(259535) Canadian Premium Sand	SE1/4 SEC 17 TWP 025 RGE 009 E1	144.80	58.60	2019-11-12	2020-12-12
QL-2968	Quarry Lease	Issued	(259535) Canadian Premium Sand	NE1/4 SEC 17 TWP 025 RGE 009 E1	159.88	64.70	2019-11-12	2020-12-12
QL-2969	Quarry Lease	Issued	(259535) Canadian Premium Sand	NW1/4 SEC 17 TWP 025 RGE 009 E1	159.88	64.70	2019-11-12	2020-12-12
QL-2973	Quarry Lease	Issued	(259535) Canadian Premium Sand	SW1/4 SEC 21 TWP 025 RGE 009 E1	159.63	64.60	2019-04-30	2020-05-30
QL-2974	Quarry Lease	Issued	(259535) Canadian Premium Sand	SW1/4 SEC 17 TWP 025 RGE 009 E1	147.77	59.80	2019-11-12	2020-12-12
				Total combined Quarry Leases	**5,307.50**	**2,147.87**		

The previous Prefeasibility Study Technical Report (Eccles et al., 2019) documented 42 Quarry Leases, one of which, QL-2925 (65 ha) was pending lease approval. At the time, an agreement between the Manitoba Department of Transportation and CPS was expected that would allow Manitoba and CPS access to the aggregate and underlying silica sand, respectively. The lease, QL-2925 was subsequently included in the Eccles et al. (2019) resource/reserve estimations.

However, Since the effective date of the Eccles et al. (2019) Technical Report, which was effectively dated 28 May 2019, the Government of Manitoba stated that the Province wants to maintain the lease for municipal aggregate supply. The QL-2925 was located on the western side of the Property. QL-2925 has been omitted in this updated 2020 Prefeasibility Study Technical Report and its updated resource/reserve estimations which supersede those of Eccles et al. (2019). It is possible that QL-2925 become available for sand extraction once the surficial aggregate resource has been depleted.

The area of mineral resources reported in this Technical Report occurs within a smaller subset of 22 Quarry Leases (of 41 total leases), as identified in Table 4.1.

With respect to the location of the newly proposed dry processing plant – no formal location has been announced by CPS and at the Effective Date of this Technical Report, CPS is in negotiations with private landowner(s). The proposed area is generally located at the southwest corner of Lake Winnipeg in the Rural Municipality of St. Andrews, MB.

4.2 Nature of Land Titles: Quarry Lease Acquisition

CPS (formerly Claim Post Resources Inc.) was incorporated on September 21, 2005 under the laws of the Province of Ontario. On November 15, 2018 the Company filed Articles of Amendment to continue under the laws of Canada. CPS obtained 100% ownership of the Wanipigow Sand Project Quarry Leases through a series of acquisitions as described below:

- On April 16th, 2013, CPS (then Claim Post Resources Inc.) initiated 100% acquisition of 9 contiguous silica sand quarry leases (the Seymourville Property), from Char-Crete Ltd. (Canadian Premium Sand Inc., 2013). The lease acquisition became marred in legal issues until May 28, 2018, when CPS announced the company had acquired the same 9 quarry leases from several third parties, including Char Crete Ltd., Simmons Construction Ltd. and O/S Investment Corp. (Canadian Premium Sand Inc., 2018a).

- On June 16, 2016, CPS (then Claim Post Resources Inc.) acquired 2 quarry leases via application to the Manitoba Government (QL-2935 and QL-2936).

- On September 14, 2017, CPS (then Claim Post Resources Inc.) announced the company had completed the purchase of an additional 9 quarry leases from Gossan Resources Limited (Canadian Premium Sand Inc., 2017). The contiguous amalgamation of the 20 quarry leases to this point in time form the main mineral resource area that is reported in this Technical Report.

- On November 15, 2018, Claim Post Resources Inc. changed its name to Canadian Premium Sand Inc. (Canadian Premium Sand Inc., 2018b).

- Finally, in 2018, CPS applied to Manitoba for the issuance of an additional 22 quarry leases, and these applications were approved in May 2019 broadening CPS's current Property to the 41 contiguous Quarry Leases as presented in Table 4.1 and Figure 4.1.

4.3 Manitoba Quarry Lease Definition, Fees and Royalties

In Manitoba, a quarry lease grants the holder the exclusive rights to explore for, develop and produce (which includes the rights to dig, work, mine, recover, procure and carry away) the quarry minerals within the leased area, subject to the payment of royalties. "Quarry minerals" include silica sand, and this term is more fully defined under *The Mines and Minerals Act,* s. 1(1) where "quarry mineral" means a mineral, other than a diamond, ruby, sapphire or emerald, that is obtained from a quarry, and includes

(a) sand, gravel, clay, shale, kaolin, bentonite, gypsum, salt, coal and amber,

(b) rock or stone that is used for a purpose other than as a source of metal, metalloid or asbestos, and

(c) a mineral that is prescribed as a quarry mineral.

A quarry lease is issued for a term not exceeding 10 years, and is renewable for further terms of 10 years, provided regulatory requirements are met.

The Manitoba quarry lease schedule of fees, rentals, deposits and expenditures is available at: https://www.manitoba.ca/iem/mines/quarry/quarry_pdfs/quarry_fees.pdf; pertinent points from these appendices are summarized as follows:

- Quarry leases are exempt from assessment work but are subject to an annual tax that is payable when: 1) applying for new leases; or 2) renewing to hold current leases. Rental for a first term quarry lease and renewals for quarry minerals other than peat is $27 per hectare or fraction thereof per year.

- Leases are crown grants and include access to the surface. Accordingly, quarry leases in Manitoba include surface rights. Rental for a surface lease is $7 per hectare or fraction thereof per year but not less than $144.

- The cash deposit required upon application for a Quarry Exploration Permit is $1,000 or $25 per hectare, whichever amount is greater.

- Any silica sand production from quarry leases is subject to a provincial royalty of $0.50 per tonne (for silica sand greater than 95% silica content; using a conversion factor of 1.78 tonnes per cubic metre).

- Other applicable provincial quarry mineral royalties include, for example:

  1) Heavy Mineral Sand containing minerals such as ilmenite, rutile, zircon, garnet, monazite, magnetite, kyanite, tourmaline, sphene, apatite and biotite of $0.39/tonne;

  2) Gravel - including crushed or screened sand and gravel suitable for use (inter alia) in concrete aggregate, asphalt aggregate, mortar sand and railroad ballast of 0.50/tonne; and

  3) Mining Backfill - quarry mineral used in a mining operation as structural fill at $0.21/tonne.

4.4 Rehabilitation Levy

A rehabilitation levy is required as per *The Mines and Minerals Act*. An operator of an aggregate quarry owned by the Crown will, no later than the 30th day following the anniversary date, or expiry of the quarry mineral disposition, remit to the recorder a rehabilitation levy in respect of the aggregate quarry minerals produced by the operator in the preceding year. That is, every operator of an aggregate quarry shall pay an annual rehabilitation levy equal to the product of the number of tonnes of aggregate quarry mineral produced multiplied by $0.12.

4.5 Royalties and Economic Participation Agreements

CPS has entered into Economic Participation Agreements with Hollow Water First Nation and the Incorporated Community of Seymourville (Canadian Premium Sand Inc., 2018d). The Economic Participation Agreements are for the life of the Wanipigow Sand Project and reflect the parties' non-financial commitment and support for the Wanipigow Sand Project. The Economic Participation Agreements also commit CPS to certain participation payments over the life of the project.

CPS has also entered into various contractual agreements relating to the acquisition of title of 18 quarry leases that included advance and future royalty payments (Gossan Resources Limited, 2017; Canadian Premium Sand Inc., 2018a).

Collectively, these Royalty and Economic Participation Agreements commit CPS to quarterly payments if/once production commences that total :

- $3.30 per tonne silica sand sold as fracture proppant;

- $2.80 per tonne of silica sand sold:

- $0.50 per tonne of construction aggregates sold.

There is a further royalty payment of $1.00 per tonne of silica sand sold as fracture proppant, $0.50 per tonne of silica sand sold and $0.50 per tonne for construction aggregates sold relating to tonnes mined and sold specifically related to the quarry leases acquired from Gossan Resources Limited.

As part of certain agreements, CPS has made advance royalty payments that are recoverable as follows:

- Upon the Company attaining commercial production, the Company is entitled to recover $1.3 million plus interest at 9% compounded annually before the production royalty owing to Char Crete Ltd. commences.

- The Company pays Gossan a semi-annual advance royalty payment of $50,000 prior to initial production which started in December 18, 2015. These advance royalty payments can be deducted from future production royalties owing once commercial production commences. The Company also has an option to re-acquire 50% of the production royalty for $1,500,000.

Lastly, in Manitoba, any silica sand production from quarry leases is subject to a Provincial royalty of $0.50 per tonne (for silica sand greater than 95% silica content; using a conversion factor of 1.78 tonnes per cubic metre).

4.6 Environmental Act Licence Issued to the Company on May 16, 2019

The Project requires a licence issued by Manitoba, pursuant to *The Environment Act* (C.C.S.M. c. E125), which applies across all phases of the project, from the earliest build phases to decommissioning

On May 16, 2019, the Company was issued the necessary environmental licence for the Wanipigow Sand Project: Environment Act Licence No. 3285 (EA Licence), subject to commercially reasonable terms and conditions. A copy of Licence No. 3285 can be found at https://www.gov.mb.ca/sd/eal/registries/5991wanipigow/index.html. Note: CPS will need to submit a notice of alteration of the *Environmental Act* Licence based on the revised mine plan outlined in this Technical Report.

As outlined in the EA Licence, the Wanipigow Sand Project will consist of an open pit sand quarry including:

1) Sequential annual quarry site reclamation;

2) Sand washing and drying within a fully enclosed wash and dry facility;

3) Ancillary facilities including permanent office and storage building;

4) A paved 6 km-long main access road; and

5) A 1.5 km gravel access road for use during Project construction and for emergencies during Project operation.

The materials submitted to Manitoba, in support of the EA Licence and additional comments or questions arising from CPS's Environment Act Proposal (EAP) outlined studies that were completed on behalf of CPS to assess the potential environmental impacts of the Wanipigow Sand Project including:

1) effects to the physical, aquatic, terrestrial and atmospheric environments;

2) Indigenous peoples; and

3) Socioeconomic environment.

Other than barge transport of wet processed sand product, none of the Project mining components or mine-site activities occur in or immediately adjacent to fish-bearing waterbodies and no Project effects to fish-bearing waterbodies, including Lake Winnipeg, are anticipated. A Traditional Ecological Knowledge study and a walk through the Project area with a respected local elder knowledgeable of traditional medicinal plants showed that the natural resources in the Project area were common to the regional area. A Heritage Resource Impact Assessment Study conducted throughout the Project site during November 2018, prior to significant snowfall, showed that no archaeological resources were identified.

As per Gifford and Samoiloff (2018), monitoring and follow-up studies proposed for the Wanipigow Sand Project include development of a Closure Plan, revegetation monitoring program, air quality monitoring (dust and noise), and on-going groundwater monitoring throughout the life of the Project. CPS has conducted a hydrogeological study and pump test of groundwater conditions at the Project Site, which is required to determine the feasibility and sustainability of groundwater use for Project operations.

The EA Licence contains a set of general terms and conditions that are intended to provide implementation guidance and to ensure the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans. Additional detail of the EA Licence is provided in Section 20.

4.7 Canadian Environmental Assessment Act, 2012, Oversight Not Required

On May 17, 2019, the Federal Minister of Environment and Climate Change, the Honourable Catherine McKennon, issued CPS a letter informing the Company that the Wanipigow Sand Project has not been designated as a project requiring federal environmental oversight under the *Canadian Environmental Assessment Act (2012).*

4.8 Conditional Use Order

As the Project substantially falls within the jurisdictional boundaries of The Incorporated Community of Seymourville, the Company was required to submit an application to the Incorporated Community of Seymourville, to utilize lands that are zoned "natural areas", under applicable Zoning and Development Plan By-laws, for the purpose of harvesting silica sand and other ancillary commercial purposes. The Company made the required Conditional Use Application, and a hearing on its application was held on May 3, 2019. On May 9, 2019, the Incorporated Community of Seymourville issued a Conditional Use Order to the Company, approving the conditional use of lands within its jurisdictional boundaries for a silica sand extraction operation, including accessory uses, building and structures.

A summary of the Quarry Leases (in whole or in part) that occur within the area of the Conditional Use Order are presented in Table 4.2. The Conditional Use Order applies to the Project through all phases of its lifecycle. Note: CPS will need to submit an amended Conditional Use Order application based on the revised mine plan outlined in this Technical Report.

4.9 Influence of Updated Mine Plan on Licencing and Conditional Use Order

Under issuance of the Environmental Act Licence approval, CPS was in a position to proceed with designing the required plans. The Company did not proceed with the detailed design while it undertook a review of the Project. That Project review resulted in a number of modifications to the plant design and Project logistics expanded elsewhere in this document.

Because the updated mine plan constitutes a change in the mode of sand transportation and plans to construct a dry processing plant at a new location, CPS will be required to submit:

- A notice of alteration to the issued Environmental Act Licence;
- An amended Conditional Use Order application; and
- New applications to the Canada Department of Fisheries and Ocean and Transport Canada.

Department of Fisheries and Ocean permits and authorization include a Species at Risk Permit and authorization under the *Fisheries Act* for the regional Fish and Fish Habitat Protection Program. The Transport Canada Navigation Protection Program is responsible for processing applications and approval under the *Canadian Navigable Waters Act.*

CPS has engaged a consulting firm to assist in identifying outstanding permitting requirements and expects to have this process completed in 2020.

Table 4.2 Quarry Leases (in whole and in part) and their legal descriptions within the Conditional Use Order.

Quarry Lease	Legal Land Description
QL-2953	NE Sec-24, Twp-025, Rge-08 Mer E1
QL-1276	SE Sec-36, Twp-025, Rge-08 Mer E1
QL-1680	SE Sec-25, Twp-025, Rge-08 Mer E1
QL-1693, QL-1682	NE Sec-25, Twp-025, Rge-08 Mer E1
QL-2959	NW Sec-21, Twp-025, Rge-09 Mer E1
QL-2973	SW Sec-21, Twp-025, Rge-09 Mer E1
QL-2926	NW Sec-29, Twp-025, Rge-09 Mer E1
QL-2936	SW Sec-32, Twp-025, Rge-09 Mer E1
QL-2932	SW Sec-29, Twp-025, Rge-09 Mer E1
QL-1692, QL-1682	NW Sec-30, Twp-025, Rge-09 Mer E1
QL-1678	NE Sec-30, Twp-025, Rge-09 Mer E1
QL-1694, QL-1895, QL-1896	SE Sec-31, Twp-025, Rge-09 Mer E1
QL-2929	NE Sec-20, Twp-025, Rge-09 Mer E1
QL-2930	NW Sec-20, Twp-025, Rge-09 Mer E1
QL-1681, QL-1691	SE Sec-30, Twp-025, Rge-09 Mer E1
QL-2957	NE Sec-19, Twp-025, Rge-09 Mer E1
QL-2957	NW Sec-19, Twp-025, Rge-09 Mer E1
QL-1642, QL-1785	SW Sec-31, Twp-025, Rge-09 Mer E1
QL-1759, QL- 1895	NE Sec-31, Twp-025, Rge-09 Mer E1
QL-1759, QL- 1785	NW Sec-31, Twp-025, Rge-09 Mer E1

4.10 Other Approvals

With its EA Licence now in hand, the Company will now be required to proceed with approval applications such as, for example:

- CPS will coordinate with Manitoba Infrastructure on approvals for the development of Project access roads, intersections and any other infrastructure development required as part of the revised logistics plan.

- General work permit(s) for the clearing of trees and land use will be requested in accordance with *The Crown Lands Act* (C.C.S.M. c C340) and applicable regulations.

- Burning permits to dispose of woody debris will be requested, as required, in accordance with Section 19(1) of *The Wildfires Act* (C.C.S.M. c W128).

- Water rights license(s) for use of groundwater needed to support the sand wash plant and associated facilities will be acquired in accordance with *The Water Rights Act*.

- CPS is in discussions with Manitoba Hydro to coordinate development of the powerline, including powerline capacity, required for the Wanipigow Sand Project.

No other federal permits or approvals are expected to be required for the Wanipigow Sand Project.

4.11 Community Consultation

Potential operations associated with the Wanipigow Sand Project are anticipated to be a substantial benefit to the Local and Regional Project Area communities in terms of training, employment, and potential business opportunities related to the services that will be required for the Project.

CPS has conducted its own extensive public engagement that has resulted in letters of support for the Project from local communities, including the Incorporated Communities of Seymourville, the Northern Affairs Settlement of Aghaming and Hollow Water First Nation. CPS now has Participation Agreements in place with Hollow Water First Nation and the Incorporated Community of Seymourville.

The Company participated in all consultation initiatives, required by Manitoba, prior to EA Licencing. The consultation process has provided local Indigenous communities with an opportunity to become engaged and informed about the Wanipigow Sand Project and share any comments, concerns and recommendations to protect Indigenous rights and environmental interests (Indigenous Business & Finance Today, 2019). The Mayor and Council of Seymourville has stated,

> "*We are simply taking the next steps first envisioned in the 1970s by our Elders to promote the development of this valuable resource. We have thoughtfully reviewed the detailed plans and worked with the Company to ensure this project fits into the economic development strategy of our community. We are satisfied that our concerns have been addressed*." (Indigenous Business & Finance Today, 2019).

Other CPS actions that will further contribute to the socioeconomic benefits of the area are set out in the issued EA Licence (see Section 20) and Conditional Use Order (see Section 4.9).

4.12 Parks and Protected Areas

The nearest park or protected area to the Wanipigow Property is the Hecla/Grindstone Provincial Park (designated in 1969 and 1997 respectively). The park is located approximately 2 km northwest of the Property and includes Hecla Island, Grindstone, Black Island and several other small islands in Lake Winnipeg. The park is 1,084 km^2 in size and is considered an IUNC Category V Protected Landscape/Seascape protected area. The park area includes the historical silica sand mining quarry(s) at Black Island.

4.13 Significant Factors and Risks

The business of exploration for, and development of, silica sand involves a high degree of risk and there can be no assurance that the current program will result in profitable operations. The Company's continued existence is dependent upon the preservation of its interest in the underlying properties, the discovery of economically recoverable resources/reserves, the achievement of profitable operations, and the ability of the Company to raise additional financing, if necessary, or alternatively upon the Company's ability to dispose of its interests on an advantageous basis.

Ownership in mineral properties involves certain risks due to the difficulties in determining the validity of certain leases and the potential for problems arising from the ambiguous conveyance history characteristics of many mining interests.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Accessibility

The Canadian Premium Sand's Wanipigow Sand Project is located approximately 160 km northeast of the City of Winnipeg, MB, the capital and largest city in Manitoba (Figure 5.1). The property is located along the east shore of Lake Winnipeg and occurs directly south of the Incorporated Community of Seymourville, MB and southwest of the Hollow Water (Wanipigow) First Nation Reserve. The largest community within an 80 km radius is Gimli, MB, which is located about 70 km west of the Property (across Lake Winnipeg) and has a population of over 6,000 people.

From Winnipeg, the Property is best accessed by:

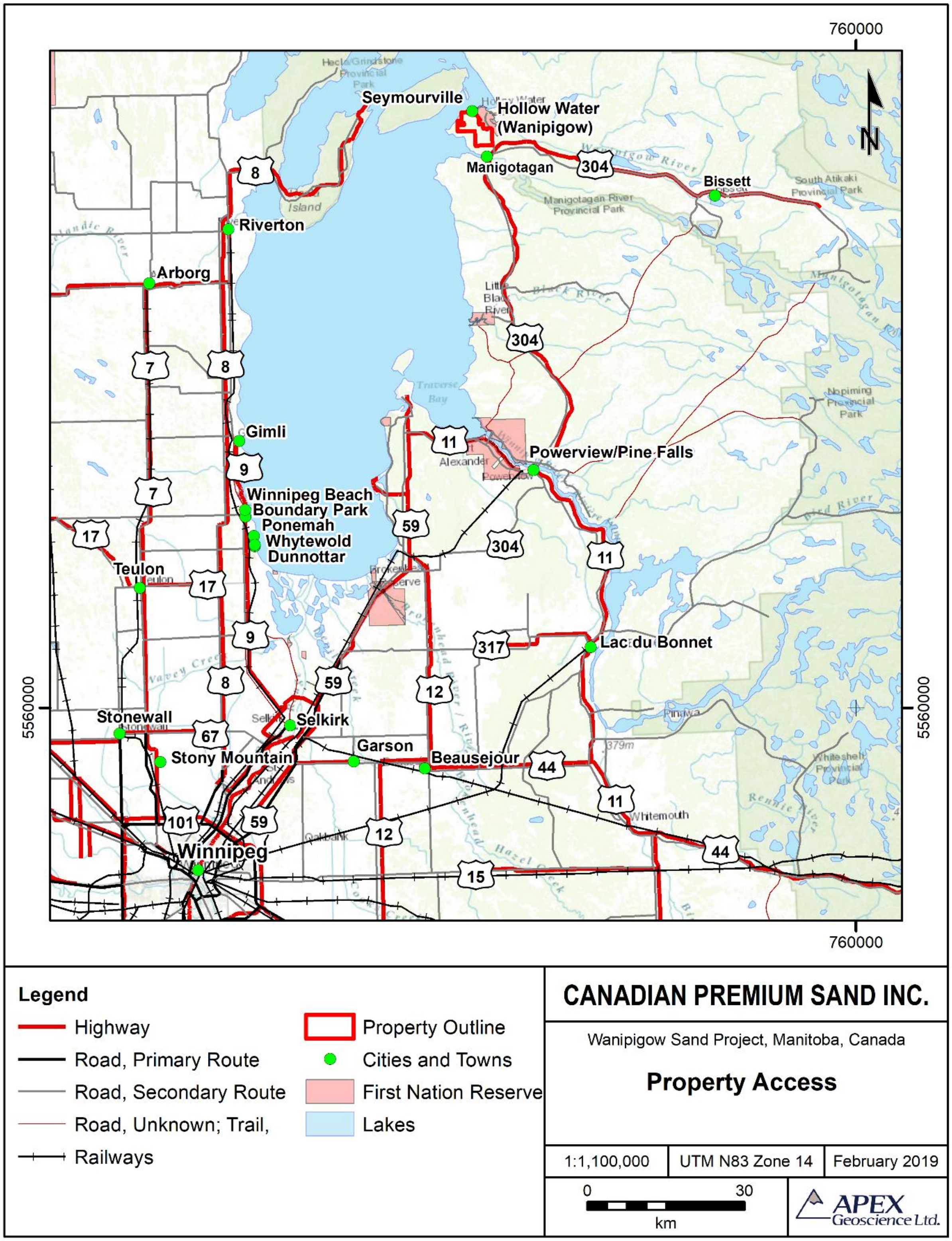
1. Travelling approximately 110 km on Provincial Trunk Highway 59N;

2. East and north on highway MB-304 N to the Town of Powerview-Pine Falls, MB, and continuing along highway MB-304 N for another approximately 75 km; and

3. Exiting MB-304 N and driving straight north on an all-weather gravel road to Wanipigow (Figure 5.1).

Another gravel road is situated directly west of the Property, which serves the communities of Manigotagan and Seymourville and permits access to cottages along the Winnipeg River system and Lake Winnipeg. This access route provides road access to the east part of the Property on its southern borders and extends northward through the northern portions of the Property.

Figure 5.1 Access to the Wanipigow Sand Project.



The nearest commercial airport is Winnipeg International Airport in Winnipeg. Local general aviation airports include Riverton Airport (FAA ID: GKG2; approximately 53 km) and Gimli Industrial Park Airport (FAA ID: CJP7; approximately 95 km).

There is no rail line access to the Property; however, the Central Manitoba Railway (CEMR) Pine Falls subdivision once ran from Beach Junction in Winnipeg to Powerview-Pine Falls, MB. Most of the track is unused at present due to the closure of the mill in Pine Falls and much of the track north of Selkirk. MB (north of Winnipeg) has been lifted. In 2018, a refurbishment project was conducted for rebuilding the first several kilometres of the subdivision line and to bring the line up to 286K standard, among other improvements. The project was to include contributions from the Canadian federal government and Cando Rail Services.

The site of the newly proposed dry processing plant is generally located at the southwest corner of Lake Winnipeg in the Rural Municipality of St. Andrews, MB. The local municipality in this region includes Dunnottar (the Village of Dunnottar), which encompasses the towns of Ponemah, Whytewold and Matlock. Dunnottar is accessed by vehicle via Provincial Trunk Highway 9; a provincial primary highway runs from Winnipeg north to Gimli, MB (Figure 5.1).

Dunnottar and town centres historically grew around Canadian Pacific Railway stations. This railway is now owned and operated as one of five Shortline Railways (SLRs), which serve as a vital part of Manitoba's transportation system. The Lake Line Railroad was formed in July 2012 to operate trains over two pieces of track, a portion of the CP Winnipeg Beach subdivision from Gimli (mile 58 and end of track) to Selkirk (mile 26.13), and a portion of the CP Lac du Bonnet subdivision from Beasejour to Molson. The Gimli to Selkirk rail line portion runs along Highway 9 (Figure 5.1). The SLRs are governed the *Provincial Railways Act* and licensed by the Manitoba government. The Lake Line Railroad interchanges with the Canadian Pacific (CP) railway in Selkirk, MB.

5.2 Site Topography, Elevation, Vegetation and Wildlife

The Property is situated on the boundary between the Boreal Shield Ecozone and the Lac Seul Ecoregion. The boreal forest is the largest of Canada's 15 ecosystems and forms a continuous belt from the east coast to the Rocky Mountains. The Lac Seul Ecoregion, a subset of the Boreal Shield, is significantly smaller and extends eastward from Lake Winnipeg in Manitoba to the Albany River in northwestern Ontario.

The topography at the Property is relatively flat with elevation ranging from approximately 225 m to 250 m above sea level. The region is underlain with crystalline Precambrian bedrock of the Canadian Shield that forms broadly sloping uplands and lowlands. Hummocky Ordovician sandstone bedrock ridges and knolls unconformably overlie the basement rocks and are in turn covered with discontinuous and undulating glaciolacustrine and glaciofluvial deposits. Locally, sandy ridges, and fens and bog, dominate the northern and east-centre/southeast parts of the Property, respectively.

The dominant land cover is over-mature, mixed-wood forest. Characteristic vegetation includes trembling aspen with white and black spruce, jack pine and balsam fir. Mixed-wood forest dominated by trembling aspen commonly occurs in areas that are moderately well- to poorly drained underlain by relatively flat Quaternary surficial deposits comprised of unconsolidated sand, gravel, and sandy clay, and ground moraine till. Poorly drained areas covered by fens and bogs are dominated by spruce.

Soils at the Property include: 1) Dystric Brunisols in areas of shallow to deep sandy glaciofluvial sediment, and in areas where bedrock crops out; 2) Organic Mesisols and Fibrisols dominate peat-filled depressions; and 3) Gray Luvisolic and Gleysolic soils occur in areas of glaciolacustrine sediment.

Wildlife includes wolf, lynx, ermine, fisher, mink, moose, black bear, woodland caribou, red squirrel and snowshoe hare. Bird species include the spruce grouse, herring gull, and double-crested cormorant, as well as bald eagle, great horned owl, red-tailed hawk, and waterfowl. Wildlife species at risk in the region include: Boreal Woodland Caribou (threatened); Little Brown and Northern Long-Eared bats (Endangered); and several threatened or endangered bird species (e.g., Common Nighthawk, Eastern Whip-poor-will, Barn Swallow, Golden-winged Warbler, Short-eared Owl).

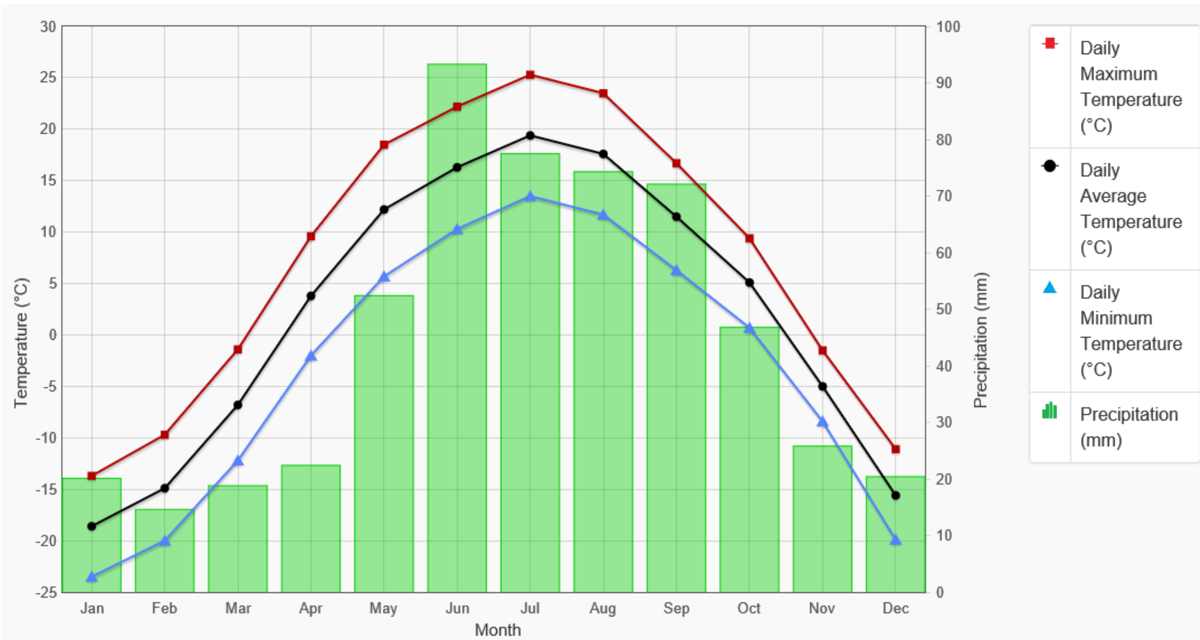
There are no fish on the Property and the nearest fish habitats are Lake Winnipeg, and the Wanipigow and Manigotagan rivers. The proposed barge loadout for transportation of wet processed sand is located on the shore of Lake Winnipeg where main fish species include walleye, sauger and lake whitefish. Other fish species include goldeye, mooneye, yellow perch and emerald shiner. Aquatic Species at Risk as per the *Species at Risk Act* (SARA) include the Mapleleaf (*Quadrula quadrula*), a mussel species that is listed as Threatened in Schedule 1 of SARA.

5.3 Climate

This ecoregion is classified as having a sub-humid mid-boreal eco-climate. The region has four distinct seasons, with short transitional periods between winter and summer. The property lies in the middle of the North American continent on a low-lying, flat plain. Due to its location in the Canadian Prairies, and its distance from both mountains and oceans, it has an extreme humid continental climate in that there are great differences between summer and winter temperatures (Figure 5.2).

Based on Powerview-Pine Falls and Seymourville climate records, the Wanipigow Property region has warm to hot summers and dry, cold subarctic winters. The mean annual temperature is approximately 2°C with a daily mean summer temperature of 19°C (July) and the daily mean winter temperature is -19°C (January). The mean annual precipitation is 540 mm with rainfall and snowfall averaging 439 mm and 100 m, respectively.

Figure 5.2 Temperature and precipitation graph for Powerview-Pine Falls. Source: Environment Canada 1971 to 2000 Canadian Climate Normals.



5.4 Local Resources and Infrastructure

Forestry, recreation, and hunting are the major land uses in this region. Powerview-Pine Falls was created as a paper mill town in the mid-1920's. In 2009, the mill was closed, and the site demolished in 2012. The mill was served by rail service, which ended after the mill closed. At present, the Interlake-Eastern Regional Health Authority Pine Falls Hospital (Pine Falls Health Complex) is the community's largest employer.

Other work opportunities for Powerview-Pine Falls, Seymourville and Hollow Water residents include gold exploration and mining opportunities associated with the Rice Lake gold belt. The Uchi Domain gold trend includes several significant gold deposits including Havilah Mining Corporation's True North (Rice Lake) Gold Mine near Bisset, MB, which is approximately 50 km northeast of the communities. Under the former guidance of Klondex Mines Ltd., True North Mine projects included refurbishing existing underground openings including test stope mining and conducting a historic tailings re-processing assessment project in 2016 (Puritch et al., 2016). Havilah Mining Corporation acquired True North in July 2018 and produced approximately 3,200 ounces of gold in roughly 4 months at an average grade of approximately 1 gram/tonne and the re-processing operation ran at an approximate rate of 900 tonnes per day (Havilah Mining Corporation, 2018).

Other past-producing or advanced projects near the True North Mine include Gunnar, Ogama-Rockland, Central Manitoba, Bissett Project and Cryderman Central gold deposits. The estimated total gold endowment in the belt is more than 5.6 million ounces (resources and past production), making it the largest gold deposit region discovered to date in Manitoba (Manitoba Commodity Files, 2017).

Workers from these communities were historically involved in mining silica sand at the Black Island silica sand quarry, which is directly northwest of the Property. The Black Island Quarry was mined periodically between 1929 and 1993 when extraction activities were abandoned, and the island became a Provincial Park. Hence, there is a history of silica sand mining in the region and neighboring communities offer potential sources for skilled and knowledgeable workers.

There is also an abundance of material and human resources that are available to support a mining operation from the City of Winnipeg.

Exploration in the region can be conducted year-round. Due to the cold winters, it is not uncommon for mining operations to close during the winter months. For example, the True North Mine has shut down its tailing reprocessing operation during the coldest winter months; current plans are to restart operations in April 2019 (Havilah Mining Corporation, 2018). It is anticipated that any silica sand operation in the region would close its Wet Processing Plant during the coldest winter months but use post-wet processed sand stockpiles to supply year-round feed to the Dry Processing Plant, which is not influenced by cold weather.

6 History

Silica sand was reportedly first discovered in Manitoba in 1859 prior to being formerly documented in 1900 (Dowling, 1900; Watson, 1985). Since then, Quaternary, Cretaceous and Ordovician quartz-rich sand has been explored for and even quarried in various forms in some areas of southern Manitoba. The intent of this section is to provide the reader with a brief history of silica sand exploration in Manitoba with emphasis on the Wanipigow Sand Project area. To help the reader distinguish between ‘off-Property’ and ‘on-Property’ historical exploration, separate sub-sections are discussed in the text that follows. In addition, a 2014 historical resource estimate is briefly discussed at the end of this History section.

6.1 Silica Sand History: Off the Wanipigow Property

The authors have been unable to verify the information presented in this historical off-Property section, and therefore, the reader should be aware that the information is not necessarily indicative of the mineralization on the Wanipigow Property.

Quaternary sand with quartz abundances considered to represent potential sources of silica sand occur in southern Manitoba. The sites can be further subdivided into: 1) Quaternary surficial deposit areas that typically down-ice from quartz-rich sand associated with the Ordovician Winnipeg Formation; and 2) Cretaceous and Ordovician bedrock deposits (Watson, 1985). Quaternary example deposits include reworked sand pits at: Beausejour-Brokenhead (46 km northeast of Winnipeg) and Libau East (directly north of Selkirk, MB). Sand from these areas has been used for: railway traction sand; as an additive to Portland cement; for brickmaking as an additive clay to control shrinkage and drying time; and for several other uses (Watson, 1985). In general, Quaternary sand would require upgrading to meet the requirements of a glass plant or any other use requiring a high-quality silica sand (Watson, 1985).

The Cretaceous Swan River Formation in south-central Manitoba includes silica-rich sand that has been deposited in pre-Cretaceous erosional channels (Venour, 1957; McCabe, 1978). During the mid-1980's, drilling by the Manitoba Geological Survey documented sand containing 95% to 99% SiO_2 near the communities of Bowsman and Duck River, MB (Watson, 1985). This study also showed that the Swan River Formation sand is predominantly fine grained with sieve analysis showing large quantities of sand concentrated between 70 and 100 mesh and -100 mesh (Watson, 1985; Ash Associates, 1996).

The Ordovician Winnipeg Formation contains the largest known deposits of high-silica sand in Manitoba (Watson, 1985). The Winnipeg Formation, which is the focus of the Wanipigow Sand Project and this Technical Report, was first described in 1900 (Watson, 1985) and is primarily exposed along the eastern shore and islands of Lake Winnipeg. Documented deposits – and their spatial relation to the Wanipigow Sand Project include:

- Black Island, which is 5 km west of the Property;
- Smith Point, which is 7.5 km south-southwest of the Property; and
- Punk Island, which is 11 km west-northwest of the Property.

The first claims for silica sand were staked on Black Island in 1910 and the first silica sand production occurred in 1929 when silica sand was barged from Black Island to Mid-West Glass in Winnipeg (Watson, 1985). Silica sand mining on Black Island continued (on and off) between 1929 and 2003 for use as feedstock to manufacture glass, fibreglass, foundry sand and silica sand for hydraulic fracturing the oil and gas industry (Puritch et al., 2014). Sand for glass processing was historically barged from the deposit to manufacturing operations in both Winnipeg and Selkirk, MB (Spiece, 1980; Pearson, 1984; Watson, 1985). The sand was taken from the island quarry in Lake Winnipeg down the Winnipeg River system to the plants. The silica sand quarry on the south shore of Black Island is still accessible and possesses some of the best outcrop exposures of the Winnipeg Formation in Manitoba (Lapenskie, 2016).

6.2 Wanipigow Sand Project: Discovery and Historical Exploration Work

Earlier references to the Wanipigow Sand Project describe the silica sand deposit as the Seymourville deposit. This nomenclature remained intact up to November 2018 when

Claim Post Resources Inc. changed its name to Canadian Premium Sand Inc. CPS renamed the deposit and thus it is referred to as the Wanipigow Sand Project in this Technical Report.

Outcrops of silica-rich Winnipeg Formation sandstone have been known to occur on the east shore of Lake Winnipeg since Dowling (1900) made his initial investigations in the area. Due mainly to accessibility issues through the early and mid 1990's, the Property area was not investigated in detail until the late 1970's and 1980's (Watson, 1985). Since this time, the Wanipigow Property area – and immediate Property area – has undergone numerous exploration programs conducted by Government and Industry. These programs tested the subsurface geology at the Property and are summarized in Table 6.1 and in the text below.

In some instances, drilling took place adjacent to, or near, the Wanipigow Property. The authors have attempted to make a clear distinction between on- and off-Property drilling, and therefore, Table 6.1 and the text below focuses only on drilling and drill information that occurred within the boundaries of the Wanipigow Sand Project.

Table 6.1 Summary of historical drilling conducted by Government and various companies at the Wanipigow Sand Project. The number of holes and drill information depicts only those holes that were drilled within the Wanipigow Property.

					Drill depth			Analytical work documented		
Year	Company	Number of holes	Drill type	Total drilling (m)	Min (m)	Max (m)	Avg (m)	Grad-ation	Proppant API	Reference
1981	Manitoba Energy & Mines	2	Diamond drill	39.0	12.0	27.0	19.5	Yes	/	Bamburak (1996)
1989	Manitoba Energy & Mines	7	Diamond drill	128.4	12.2	24.7	18.3	/	/	Bamburak (1996)
1992	Manitoba Energy & Mines	3	Diamond drill	18.4	4.9	6.6	6.1	/	/	Bamburak (1996)
2002	Claymore Kaolin	2	Diamond drill	36.6	15.2	21.3	18.3	Yes	/	Chornby (2003)
2004	Gossan Resources	11	Reverse Circulation	188.4	11.0	21.3	17.1	/	/	Pedersen (2007)
2006	Gossan Resources	23	Auger drill	378.1	7.3	22.9	16.4	/	/	Pedersen (2007)
2008	Gossan Resources	26	Sonic drill	377.4	10.7	19.2	14.5	Yes	Yes	Cooke (2008), Cooke (2010)
2014	Canadian Premium Sand	2	Sonic drill	36.6	18.3	18.3	18.3	/	/	CPS (pers. comm., 2014)
2014	Canadian Premium Sand	3	Auger drill	23.7	5.5	9.1	9.1	/	/	CPS (pers. comm., 2014)

In 1981, Manitoba Energy and Mines conducted a drill program across the Wanipigow area in which they drilled 12 diamond drillholes. Only 2 of the 12 holes were drilled on the present-day CPS quarry leases (Table 6.1). Of these two holes, a 25 m Winnipeg Formation silica sand intersection was reported (hole ID M20-81) with a silica yield of up to 96% SiO_2. The gradation and whole-rock geochemical tests completed on the samples returned an 80% recovery of well-rounded silica sand with sand sizes ranging from 20 to 100 mesh. The processed Winnipeg Formation sand had a silica purity of 98.2%, which was upgraded to 99.8% after an acid wash (Puritch et al., 2014). Manitoba Energy and

Mines returned to the drill site on the Property in 1989 to drill 7 additional drillholes with silica sand intersections of 18 m (Bamburak, 1996).

In 1992, 3 diamond drill holes were drilled on the Property by Manitoba Energy and Mines. The results obtained less than 10 m thick intersection of Winnipeg Formation sand in the immediate drill area. This was possibly the result of erosion of the overlying beds (Bamburak, 1996). To the best of the authors knowledge, no other data is available for these holes.

In 2002, Claymore Kaolin Ltd. & Cando Contracting Ltd. conducted exploration work on the Wanipigow Property. The work consisted of drilling 2 vertical diamond drillholes (S-1 and S-2); of the 2 holes, only S-2 intersected silica sand with a thickness of 14.19 m that analyzed 95.2% SiO_2. Gradation size analysis concluded that 12.1% of the sand was 20/40 mesh and 78.8% of the sand was in the 40/140 mesh fraction (Chornoby, 2003).

Gossan Resources Limited (Gossan Resources) acquired 9 quarry leases on the Wanipigow Property in 2001. In 2004 the Company completed a reverse circulation (RC) drill program that completed 11 drillholes. Reportedly, there was significant contamination of samples because of using the RC drilling process in a sandy substrate (Pedersen, 2007).

In 2005, Gossan Resources acquired the quarry leases previously owned by Claymore Kaolin Ltd. In 2006, Gossan Resources completed a 23-hole auger drill program on the property totalling 378.07 m (Pedersen, 2007). The goal of this program was to determine a more accurate extent of the deposit and to delineate the sub-surface stratigraphy. Whole-rock geochemical analytical work on samples acquired during the drill program resulted in an average of 94.31% SiO_2, 2.50% Al_2O_3, 0.67% Fe_2O_3, and 0.23% CaO (Pedersen, 2007).

In addition to geochemical work, a grain size analysis study on the Gossan samples provided average percentages of 9.7% of 20/40 fraction and 71.6% of 40/200 fraction (Pedersen, 2007). The size analysis was questionable at the time because of potential contamination using the auger drill. While the program did lead to a more in depth understanding of the deposit dimensions, the drilling method lead to generally poor sample return with contamination.

In 2007, Gossan Resources conducted a trenching program with no significant results published (Cooke, 2008).

Gossan Resources conducted further drilling in 2008. This program utilized a sonic drill rig and resulted in 26 drillholes totalling 377.41 m (Note: only 366.13 m were logged due to a loss of sample material). The sonic drill provided a better sample return than what was previously acquired using a RC or auger drill; even then, complications did happen during the project and subsequently only 7 of the 26 holes were fully drilled through the Winnipeg Formation and into the underlying Precambrian basement rock

(Cooke, 2008). Analyses were carried out on the sonic drill samples in the following years (from 2009-2010) to further evaluate the proppant quality of the sand.

The Gossan 2008 drill program samples were separated by colour and averaged to delineate the purity of the sand by colour. Geochemical analysis on these sample splits resulted in assay results as presented in Table 6.2, in which the multi-coloured sand splits yielded similar silica results of between 93.46% SiO_2 (intermixed sand colours) and 94.75% SiO_2 (tan-coloured sand).

The sand was also sent for attrition scrubbing and sieve analysis revealed that approximately 60-75% of the sand was in the 40/140 fraction size.

In 2010, Gossan Resources conducted a market study to assess the viability and cost of maintaining the property (World Industrial Minerals, 2010). The study concluded that the sand "*meets specifications, and appears suitable for the following markets: frac, fiberglass, recreation, metallurgical, construction, filtration and well pack.*"

Table 6.2 Assay results of the 2008 Sonic Drill program (Cooke, 2008).

Sand Colour	Average SiO_2 (%)	Range (%)	Average Al_2O_3 (%)	Range (%)	Average Fe_2O_3 (%)	Range (%)
Brown	94.12	89.15-96.37	1.51	0.39-3.78	1.73	0.28-2.19
Orange	94.67	90.94-98.26	1.08	0.46-3.25	2.10	0.66-3.52
White	94.40	88.33-98.84	1.66	0.42-5.56	1.60	0.16-2.08
Intermixed	93.46	89.24-97.61	1.98	0.45-4.26	1.56	0.04-2.84
Tan	94.75	93.20-98.02	1.16	0.64-2.15	1.75	0.29-2.84

In 2014, CPS (then Claim Post Resources Ltd.) drilled 5 drillholes at the Property. The program consisted of 3 auger drillholes and 2 sonic drillholes. The program was unsuccessful due to: 1) the auger drill not being powerful enough to penetrate the Pleistocene glaciofluvial; and 2) the sonic drill yielding poor material recovery and not being able to drill deeper than approximately 10 m. Due to the drilling problems encountered and a small exploration budget, the program was cancelled with no adequate sample being collected.

The next exploration program was conducted by CPS in 2018; a total of 93 sonic drill drillholes were completed. This work forms the foundation of this Technical Report. The drillhole program is described in detail in Section 10, Drilling and throughout the report.

7 Geological Setting and Mineralization

7.1 Regional Geology

The regional bedrock geology of the Wanipigow Sand Project area comprises Ordovician sandstone of the Winnipeg Formation that unconformably overlies the Precambrian crystalline basement (Figure 7.1). The Winnipeg Formation is overlain regionally by the Red River Formation carbonate rocks. The Ordovician units collectively form part of the WCSB, which can be viewed as a wedge of Phanerozoic strata above Precambrian crystalline basement. The WCSB wedge tapers from a maximum thickness of about 6000 m in the axis of the Alberta Syncline (just east of the Rock Mountains foothills front in Alberta) to a zero-subcrop-edge to the northeast-east along the Canadian Shield (in parts of Alberta, Saskatchewan and Manitoba).

The Winnipeg Formation is an erosional isolated element of the eastern North America Cratonic platform succession deposited across the Transcontinental Arch; a northeast–southwest trending tectonic feature across the western midcontinent of North America that had a significant tectonic influence during the Phanerozoic (Osadetz and Haidl, 1989; Bezys and Conley,1996). The Winnipeg Formation was deposited in shallow marine seas during the Middle Ordovician (Bezys and Conley,1996), and therefore is manifested laterally as a flat lying to shallow westerly dipping unit of clastic sedimentary rocks.

Regionally, the Winnipeg Formation consists of a complex sequence of interbedded sand and shale, ranging in composition from >90% shale to >90% sandstone (Bezys and Conley,1996). Sandstone dominant, and more specifically, silica sand-rich intervals of the formation are known to crop out on the eastern and western shores of Lake Winnipeg and on several islands in the eastern part of Lake Winnipeg including Black, Punk, Little Punk and Deer islands (Watson, 1985; Lapenskie, 2016). The Winnipeg Formation represents the silica sand unit that is being targeted by CPS along with the overlying Quaternary surficial material, which includes reworked Winnipeg Formation sandstone.

Geological descriptions of the Precambrian Basement, the Ordovician Winnipeg Red River formations, and the Quaternary surficial deposits are described in a regional perspective in the text below.

7.1.1 Precambrian Basement

The Precambrian crystalline basement is the lowermost geological unit in the project area (Figure 7.1). The basement rocks form part of the Archean Superior Province and may mark the Mesoarchean western margin of the North Caribou terrane, which is one of the largest blocks of Mesoarchean crust in the Superior Province (Percival et al., 2001).

While the regional basement geology is partially obscured by the Ordovician sedimentary rocks and Quaternary surficial deposits – especially in the Property area – the regionally underlying Archean rock assemblages include from north to south: North

Caribou Terrane biotite granodiorite (ca. 2.715 Ga); layered quartz diorite-diorite; Hole River arkose and conglomerate (ca. <2.706 Ga); and Rice Lake Belt greywacke and basalt (Percival et al., 2001). The East Shore Plutonic Complex contains a 1-2 km wide body of homogeneous hornblende-biotite tonalite that underlies the east shore of Lake Winnipeg and eastern islands (Figure 7.1). The pluton grades eastward into layered tonalite, quartz diorite, diorite and sheets of gabbro. Gabbroic sills minor serpentinite schist occurs sporadically within the tonalite within and near the Property.

The sedimentary-volcanic Lewis-Storey assemblage unconformably overlies the tonalitic basement along the eastern side of Lake Winnipeg. The assemblage includes arkosic grit overlain by quartzite, talc-serpentine schist, komatiite and banded iron formation. These are in turn overlain by lower greenschist-facies volcanic and volcaniclastic rocks of the Black Island assemblage (Bailes and Percival, 2000). A poorly preserved sedimentary-volcanic sequence occurs along the southern margin of tonalite in the Wanipigow River area.

Tectonic reconstruction of major lithotectonic domains is hindered by structural complexity and the general lack of exposure. The east trending Seymourville shear zone runs along the northern edge of the Property (Figure 7.1) and marks the southern limit of the Hole River sedimentary sequence.

A set of northwest-trending high-strain zones converge into this area, corelate with the Lewis-Storey assemblage and may bound structural domains (Percival et al., 2001). The Wanipigow Fault occurs east of the Property and separates tonalite to the north from metagreywacke to the south (Figure 7.1; Weber, 1991).

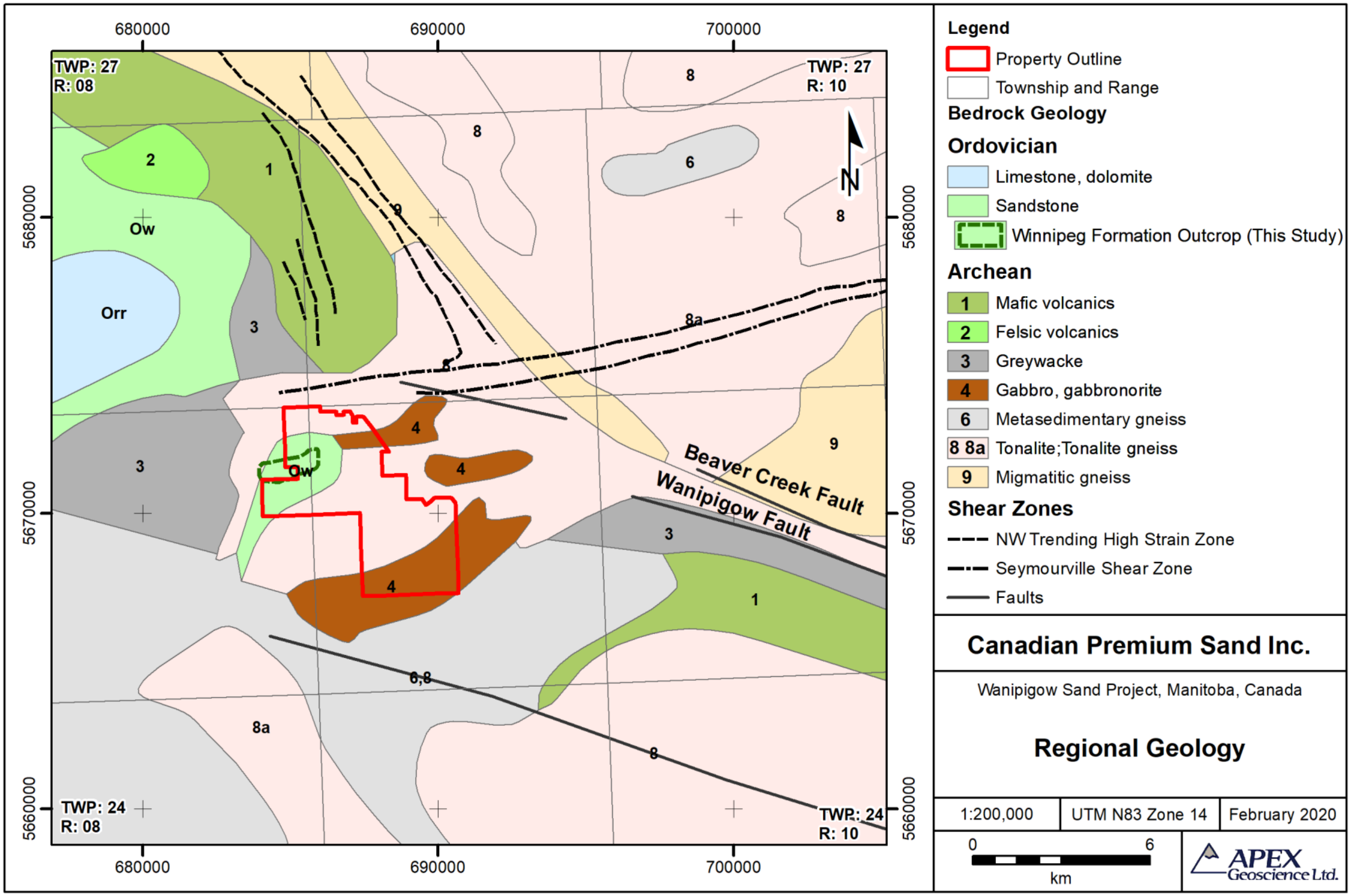
7.1.2 Ordovician Winnipeg Formation

The Winnipeg Formation unconformably overlies the Precambrian basement in the project area. The Formation ranges in thickness from 0-60 m and consists of interlayered sand and shale that were deposited in a shallow marine sea during the Middle Ordovician. Bezys and Conley (1996) describe the sands of the Winnipeg Formation as mostly poorly consolidated, medium grained, mature, well rounded, and quartzose. The Winnipeg Formation shale is mostly light olive-grey, kaolinitic, with variable sand and silt content.

The Winnipeg Formation can be sub-divided into the Black Island and the Iceberg members (Figure 7.2). The Black Island member is the lower stratigraphic member and consists of a thin basal sandstone overlain by interbedded sand and shale. Some shale zones of the Black Island Member contain pyritic, phosphatic, and/or limonitic concretions and ooids (Bezys and Conley, 1996).

The Iceberg Member is the upper stratigraphic member of the Winnipeg Formation and is considered a transitional zone between the Winnipeg Formation and the overlying Red River Formation (Bezys and Conley, 1996). The Iceberg Member is composed of grey and red shale and argillaceous sandstone.

Figure 7.1 Generalized bedrock geology in the Wanipigow Sand Project area.



7.1.3 Ordovician Red River Formation

The Red River Formation overlies the Winnipeg Formation with the Dog Head Member representing the lowermost subunit. It consists of carbonate dolostone and limestone. A transitional zone between the Winnipeg Formation and the Red River Formation is occasionally observed in the basal Red River Formation as strata containing argillaceous interbeds of Winnipeg-like lithology (Bezys and Conley, 1996). The Red River Formation is present on Black Island but does not occur within the Wanipigow Property.

7.1.4 Quaternary/Pleistocene Surficial Deposits

The northern and southern parts of the Property are dominated by Ordovician Winnipeg Formation bedrock and Quaternary surficial deposits, respectively (Figure 7.3). The authors have used Manitoba's Surficial Geology Compilation Map Series to make regional observations of Quaternary material in the general Property area (Matile and Keller, 2004a,b).

The Wanipigow Property is near major southern Manitoba landforms that include the Precambrian Shield, Birds Hill-Belair moraine and the northeast limit of carbonate glacial debris. In the Precambrian Shield region, Quaternary sediments can be quite thick, but discontinuous, and rarely completely infill bedrock lows.

In the Property area, the glacial advance was generally from the northeast and the glacial material such as glaciofluvial deposits are typically sand rich. The Interlake region of Manitoba is dominated by streamlined landforms in the lower areas and glacial retreat occurred in a series of steps marked by moraines such as the Birds Hill-Belair moraine, which extends 100 km from the Red River lowland northward to the eastern shore of Lake Winnipeg (Burt, 2002).

Glacial striations on Precambrian outcrops near the Property show the dominant direction of ice flow is east-northeast flowing to west-southwest (Matile and Keller, 2004a,b). Dominate surficial deposits in the Property area include:

- Offshore glaciolacustrine sediments composed of clay, silt and sand. These deposits are commonly 1 to 20 m thick and form low relief, massive and laminated deposits. The sediments were deposited from suspended offshore, deep water of glacial lake Agassiz, and were commonly scoured and homogenized by icebergs.

- Marginal glaciofluvial sediments of sand and gravel. The deposits are 1-20 m thick and form ridges, spits, bars, and littoral sand and gravel. Typically, these deposits were formed by wave action at the margin of glacial Lake Agassiz. Marginal glaciolacustrine are also evident.

Less prominent, sporadic surficial material includes organic deposits (peat and muck) that accumulated in in low relief wetland areas (fen, bog, swamp and marsh). Diamicton deposits, or till, occur as clay-rich subglacial deposits in low-relief areas.

Figure 7.2 Stratigraphic section examples for the Winnipeg Formation in the Wanipigow Sand Project area. The far right (C) section was constructed during the preparation of this Technical Report and its nomenclature is used throughout the report.

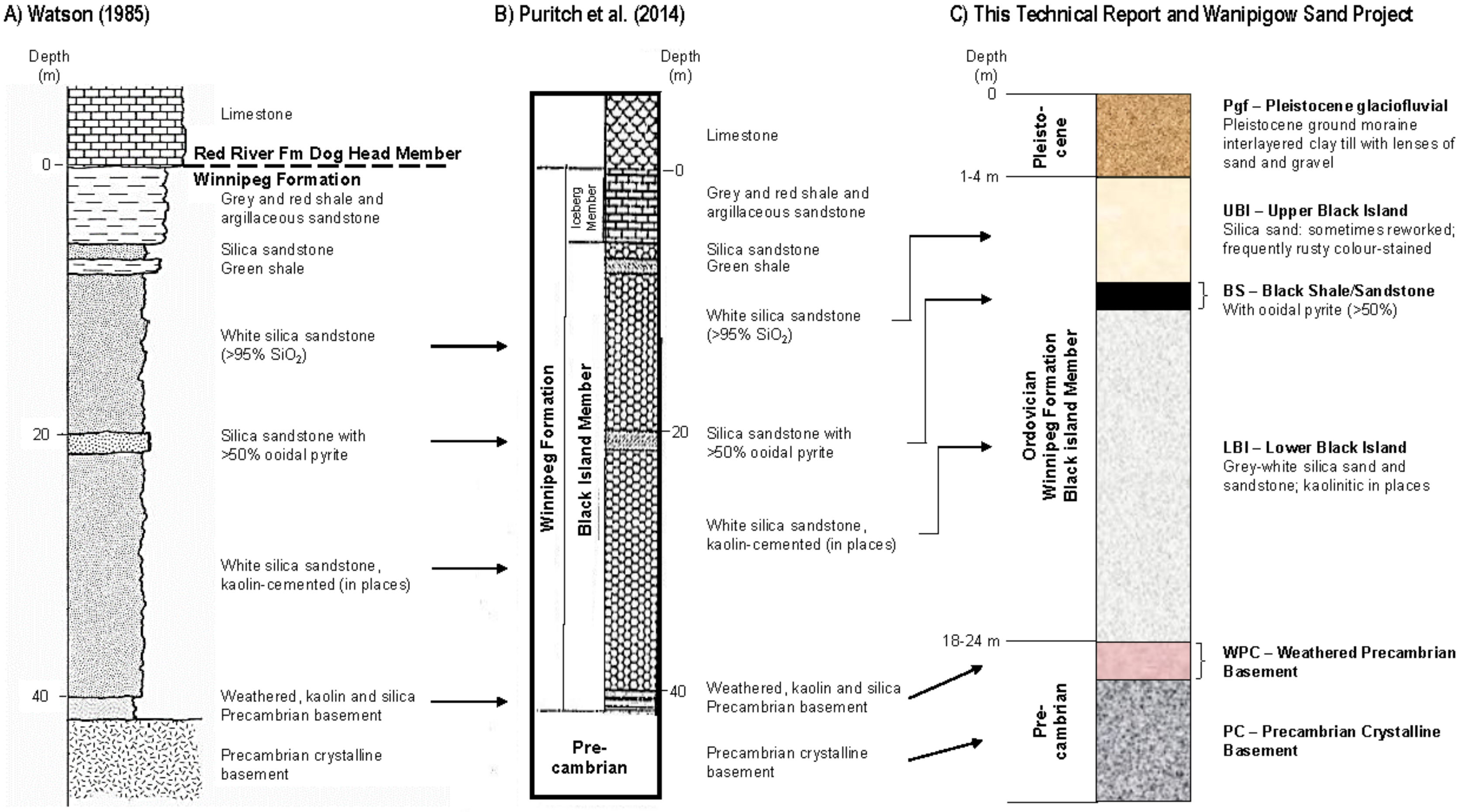
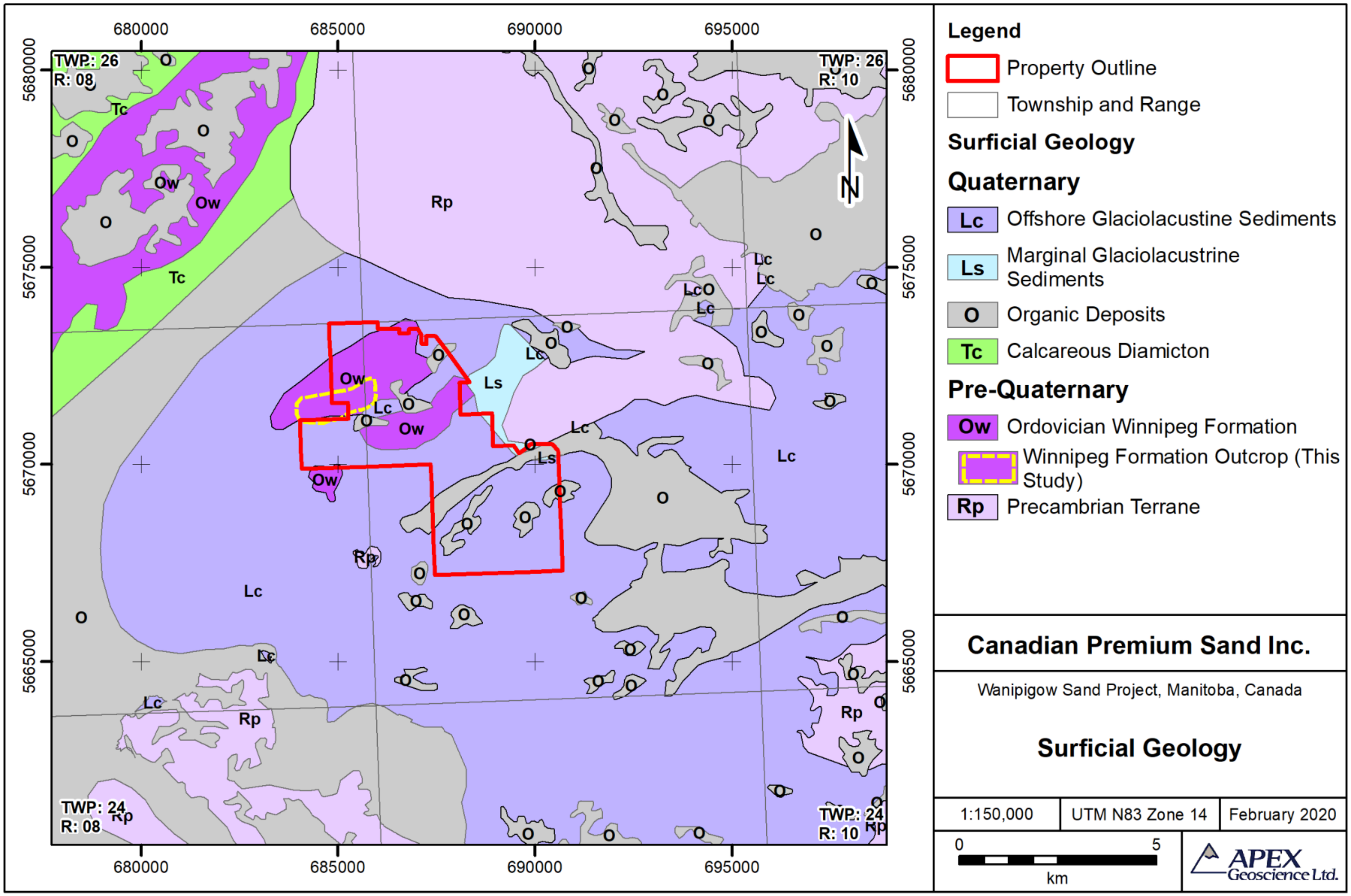


Figure 7.3 Quaternary surficial deposits in the Wanipigow Sand Project area.



7.2 Property Geology

The Winnipeg Formation unconformably overlies the Precambrian crystalline basement and crops out in the eastern part of the Wanipigow Property (Figure 7.1 and 7.3). All CPS 2018 drillholes (n=93) were drilled through the entire Winnipeg Formation sedimentary rock package and penetrated downward into the uppermost basement surface. Hence, the crystalline basement rocks form the basal surface of Wanipigow Sand Project's geological model. In drill core, the Precambrian basement is manifested as dominantly crystalline mafic volcanic and intrusive rocks that become increasingly weathered, kaolinitic and silica-enriched at the basement rocks uppermost contact with the Winnipeg Formation.

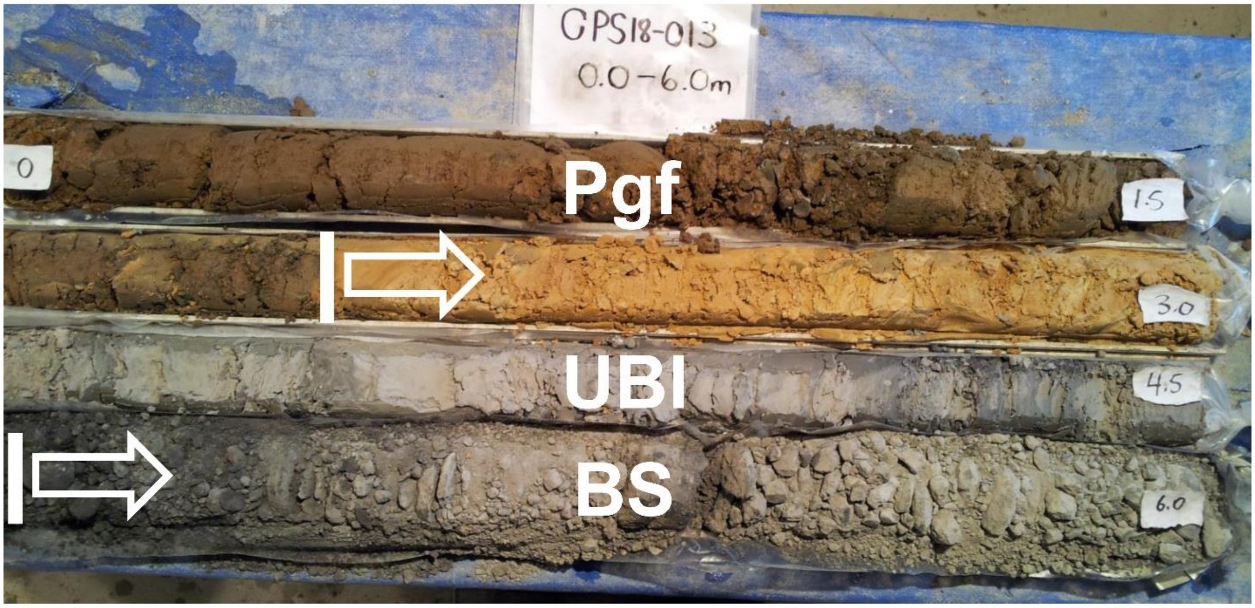
Drilling to the Precambrian basement allowed the authors to assess the entire Winnipeg Formation as it exists at the Property. Based on drill logs, lithological observations and grain size particle distributions, this current study subdivides the Winnipeg Formation into four distinguishable subunits that are presented in Figure7.2 and include from bottom to top: Lower Black Island; Black Shale; Upper Black Island; and Pleistocene glaciofluvial.

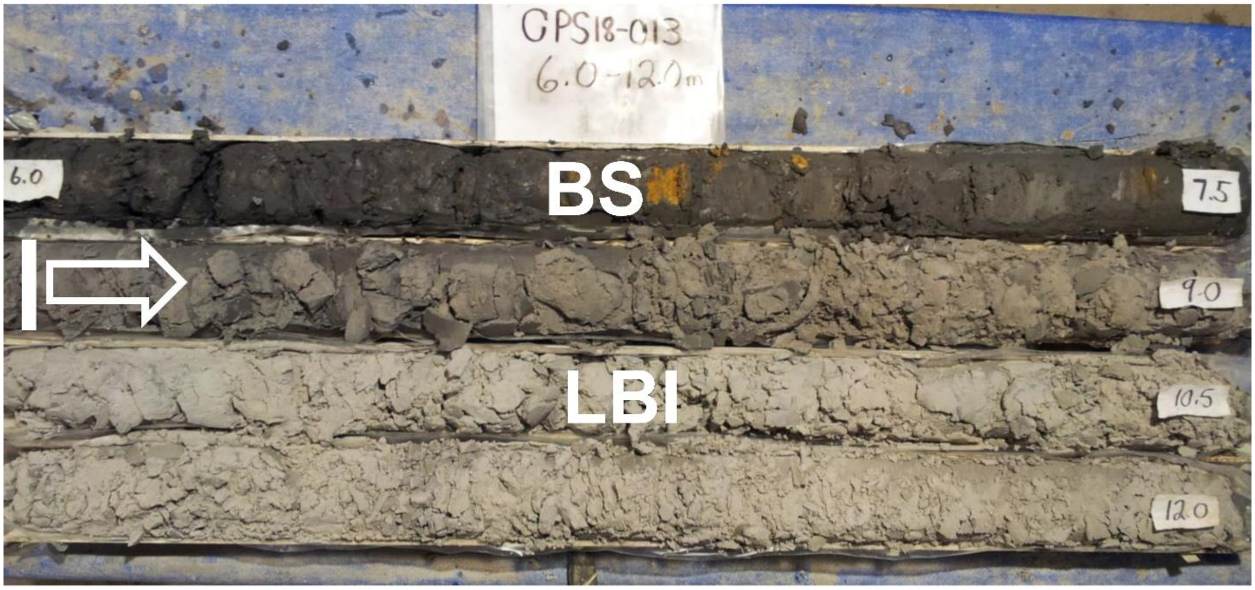
The units – as they exist at the Property – are described in the text that follows and shown in core photographs in Figure 7.4.

Lower Black Island (LBI): The basal subunit of the Winnipeg Formation is characterized by grey-white silica sand with minor kaolinite cement (Figure 7.4). The LBI was intersected in 45 drillholes (or 48% of the 2018 drillholes; see Section 10, Drilling). The thickest LBI intersections were up to 15.9 m and average approximately 7.9 m when present. As the LBI nears its contact with the overlying Black shale/sandstone unit, some orange coloured staining is occasionally observed (especially if exposed at surface like on Black Island off property). This is most likely due to iron oxidation in the BS leaking into the surrounding units. The staining has been documented to be removed easily with scrubbing processes. The top of the LBI represents the most distinguishable and best understood contact in the Wanipigow Property subsurface.

Black Shale/Sandstone (BS): The BS shale/sandstone overlies LBI and is characterized by a thin layer of black shale that periodically comprises ooidal pyrite. The shale is often intermixed with sandstone and siltstone, which is stained black and therefore distinguishable from the underlying and overlying LBI and UBI (Figure 7.4). The BS unit occurs in the western part of the Property and resource area drilling showed that the BS pinches out completely in the east part of the Property. The BS was intersected in 14 drillholes (or 15% of the 2018 drillholes; see Section 10, Drilling). The thickest BS intersections were up to 3.5 m and average approximately 2.0 m when present.

Figure 7.4. Core photos illustrating the Lower Black Island (LBI), Black Shale (BS), Upper Black Island (UBI) and Pleistocene glaciofluvial (Pgf) subunits used in this Technical Report. From drillhole CPS18-013. Units in metres.





Upper Black Island (UBI): An upper Winnipeg Formation subunit (UBI) overlies the BS and is characterized by a white to rust-coloured/stained silica sand (Figure 7.4). Staining is likely related to the pyritic black shale underlying the UBI. Like the BS, the UBI is also best represented in the western part of the Property. The UBI crops out in the far western portion of the Property and pinches out eastward. The UBI was intersected in 22 drillholes (or 24% of the 2018 drillholes; see Section 10, Drilling). The thickest UBI intersections are up to 19.0 m and average approximately 4.6 m when present.

Pleistocene glaciofluvial (Pgf): Sand and gravel surficial deposits are more-or-less ubiquitous at the Property; only 7 drillholes, or 8% of the 2018 drillholes, did not intersect Quaternary material. The maximum thickness of the Pleistocene glaciofluvial is 24 m and averages approximately 10.7 m when present. At the Property scale, the Pgf is characterized by ground moraine till material comprised mainly of interlayered clay with lenses of sand and gravel. In places, the Pgf includes intercalated and/or lenses of reworked UBI, and black clay till with pebbles and cobbles to distinguish from mudstone. The Pgf overlies UBI in the eastern part of the Property. As the BS and UBI units pinch out in the central and western parts of the Property, the Pgf takes over and directly overlies LBI in the western Property.

The Red River Formation, which stratigraphically overlies the Winnipeg Formation, does not appear within the Property.

7.3 Mineralization

The American Petroleum Institute (API) and International Organization for Standardization (ISO) have a recommended set of specifications for proppant to be used in oil and gas hydraulic fracturing. Key criteria include:

1. pore space potential, which means the grains must be of sufficient dimensions, and round and spherical such that when the grains are packed into a fracture zone the porosity is such that the petro-product is allowed to flow and be recovered; and

2. crush resistance, which means hard, inert silica- or quartz-rich sand grains are of better quality in comparison to deleterious soft grains such as carbonate as the latter would reduce pore space upon compaction and being crushed to powder.

The 'quality' of Winnipeg Formation silica sand from the Wanipigow Property – as per API and ISO standards – is presented in Section 13, Mineral Processing and Metallurgical Testing. In addition, the gradation data form the main 'assay' file in the resource estimation block model presented in Section 14, Mineral Resource. As such, this section introduces the reader to the general Winnipeg Formation silica sand mineralization within the Wanipigow Property from a silica content and gradation perspective.

As a note on the Winnipeg Formation subdivisions presented in the Property Geology sub-section text above, historically, the Winnipeg Formation at the Property was thought to include 'White Sandstone; and 'Coloured Sandstone' units with the Black Shale unit being lumped into Pleistocene glaciofluvial. Based on core observations from CPS's 93-drillhole 2018 program, together with outcrop and gradation mapping conducted during the program, the authors feel the subdivision of LBI, BS, UBI and Pgf is more representative of the subsurface geology at the Property and is justified and defensible.

The subdivision stratigraphic picks were correlated across the Property and have been incorporated into the three-dimensional model and the resource estimation presented in this Technical Report.

Accordingly, the authors consider mineralization, or silica sand potential, in all subunits except for the Black Shale unit (i.e., LBI, UBI and Pgf).

With respect to the silica content of the Winnipeg Formation, Watson (1985) reported that the Wanipigow Sand Project comprises high-silica sand that is low in deleterious elements and cemented by kaolin and iron oxides that are readily removed by washing. In assessment of numerous potential sources of silica sand in Manitoba, it was reported that the Wanipigow Property area yielded the highest silica purity (up to 99% SiO_2) of all samples tested (e.g., Watson, 1985; Lapenskie, 2016). Significantly, Puritch et al. (2014) demonstrated the quartz-rich nature of the sand in that 255 sand samples from the Wanipigow Property had a mean silica value of 94.2% SiO_2.

With a high silica (quartz) content established, CPS's 2018 drill program focused on the particle grain size distribution of the sand as an advanced approach to model and evaluate the resource potential of the deposit. While Section 14 provides a detailed geostatistical analysis of the sand particle grain size distribution, Table 7.1 and Figure 7.5 provide a gradation summary on a unit by unit basis.

The analysis shows the Wanipigow Sand Project yields a high percentage of gradational sizes that are beneficial to the oil and gas hydraulic fracking industry, including 20- to 70-mesh sand for oil production and 40- to 140-mesh sand for gas production. General observations of the gradation averages include:

- The Lower Black Island subunit comprises the highest mean percentages of 20-mesh to 70-mesh sand;
- The overlying Upper Black Island sand has the highest modal abundances of 70/140 fraction sand; and
- The Pleistocene glaciofluvial has the highest amount of fine (140- and 200-mesh sand and Pan or -200 mesh sand; Table 7.1; Figure 7.5).

Graphical cross-sections of selected drillholes, which include geology and 30/50 and 50/140 fractions, are presented in Figure 7.6. The sub-figures step across the Wanipigow Property from east to west and demonstrate that silica sand is prospective in all geological subunits (LBI, UBI and Pgf). The example shows that LBI has the highest modal abundance of 30/50 and 50/140 sand fractions, but the UBI and Pgf have appreciable amounts (up to 25% 30/50 and up to 50% 50/140).

The figure also demonstrates how the BS and UBI pinch out and are non-existent at the eastern parts of the Property. Hence the Pgf is thicker here and rather than being a detriment to the mining process, presents a scenario where the Pgf provides a secondary source of silica sand material.

A potential impediment to the quality of the Pgf unit is the clay or ultra-fine sand fraction (demonstrated as the -200, or 200 plus Pan fractions, in Figure 7.6-C). It should also be noted that Pleistocene glaciofluvial content is variable across the Property, and in some instances, there is very little clay component. For example, glaciofluvial-dominated sections contain higher abundances of sand and gravel versus the -200 fine fractions associated with glaciolacustrine material.

Table 7.1 Gradational summary of the of the Lower Black Island, Upper Black Island and Pleistocene glaciofluvial subunits.

Mesh size	Lower Black Island (mean %; n=236)	Upper Black Island (mean %; n=57)	Pleistocene glaciofluvial (mean %; n=451)
16 to 20	3.76	3.98	10.31
20 to 30	4.80	2.51	5.37
30 to 40	8.68	4.72	6.84
40 to 50	13.06	9.25	8.82
50 to 70	18.43	17.61	11.03
70 to 140	30.26	32.33	25.21
140 to Pan	21.01	29.60	32.43

Figure 7.5. Mean modal abundance of selected gradation sizes for Lower Black Island, Upper Black Island and Pleistocene glaciofluvial samples.

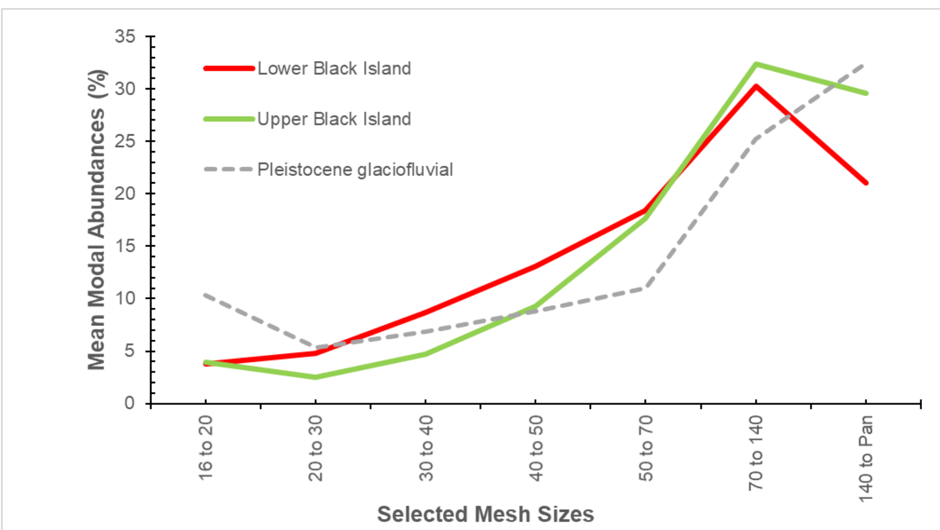
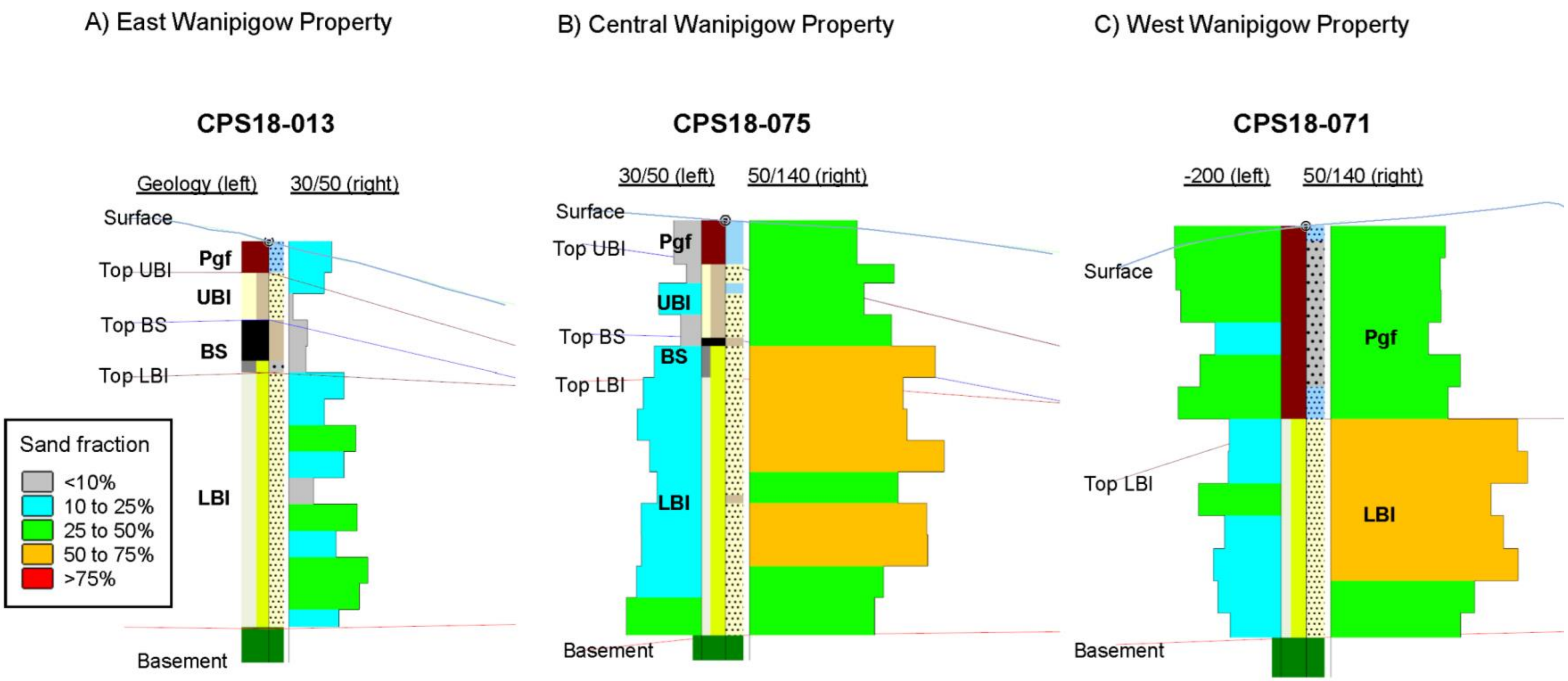


Figure 7.6 Graphical representation of selected drillholes and size fractions in the eastern, central and western parts of the Wanipigow Property.



Unit thicknesses (m)	
Pleistocene glaciofluvial	1.8
Upper Black Island	2.7
Black Shale	3.0
Lower Black Island	14.5
Precambrian	2.0
End of Hole (m)	24.0

Unit thicknesses (m)	
Pleistocene glaciofluvial	2.1
Upper Black Island	3.5
Black Shale	1.9
Lower Black Island	12.3
Precambrian	1.2
End of Hole (m)	21.0

Unit thicknesses (m)	
Pleistocene glaciofluvial	9.0
Upper Black Island	0.0
Black Shale	0.0
Lower Black Island	10.2
Precambrian	1.9
End of Hole (m)	21.0

8 Deposit Types

The best deposits of silica sand are characterized by super-mature marine shoreline sandstone deposits that have a long history of reworking, were never deeply buried, and underwent minimal diagenesis (or diagenesis that reduced or removed cements; Winfree, 1983; Dott et al., 1986; Dott, 2003). The depositional environment and factors to increase mineralogical maturity must include multiple cycles of mechanical reworking that enhance roundness, sphericity and sorting of grains (Benson and Wilson, 2015). The most prospective settings for the accumulation of mineralogical and mechanically competent silica sand, therefore, occur in marine shoreline, marine shoreface, marine intertidal and deltaic settings, and coastal aeolian environments (e.g., Winfree, 1983; Dott et al., 1986; Dott, 2003). A textbook geological example is Northern White silica sand which formed in the Cambrian and Ordovician settings of central mid-continental North America (Minnesota, Wisconsin and Iowa).

The Wanipigow Sand Project fits into this category. The Ordovician Winnipeg Formation contains the largest reserves of silica sand in Manitoba (Watson, 1985). The sand is distinguished from all other sediments in the Williston Basin portion of the WCSB due to its high-silica content, well-rounded shape and loosely kaolinitic cementation. The following text considers the geological model that shaped the Wanipigow deposit and the concepts applied in the investigation of the deposit.

The Williston Basin is a large intracratonic sedimentary basin in eastern Montana, western North Dakota, South Dakota, and southern Saskatchewan and Manitoba. The Winnipeg Formation represents the initial Williston Basin clastic sedimentary deposits and were the result of a Late Ordovician transgression that influenced most of the North American craton. Late Ordovician sedimentation began with a large-scale marine transgression from the southeast that led to the deposition of shoreface sandstone to offshore mudstone of the Winnipeg Formation (Vigrass, 1971; Kreis, 2004; Dorador et al., 2014). During the early stages of the transgression, the lower Winnipeg Formation was deposited in relatively shallow conditions, ranging from shallow marine, intertidal to deltaic, and is composed primarily of sandstone (Vigrass, 1971). The upper Winnipeg Formation is composed of varying amounts of sandstone to mudstone and is interpreted as being deposited in deeper marine to shallow marine and possibly terrestrial environments (McCabe, 1978).

To conclude, based on the Shield proximal setting and composition and texture of the Wanipigow silica sand, it is apparent that the Black Island Member sandstone formed in a similar depositional environment as Wisconsin Northern White sand. The Wanipigow Black Island Member sand represents a mature marine shoreline sandstone deposit with a long history of reworking, was never deeply buried, and underwent minimal diagenesis.

Geological models and concepts applied in the investigation of silica sand in southeastern Manitoba generally involve: delineation of areas underlain by prospective rock units (i.e., Ordovician Winnipeg Formation); drilling or trenching to determine potential deposit dimensions and to obtain representative sample material for evaluation;

and physical and chemical parameter testing of the sand unit to determine its quality and potential for petro hydraulic fracturing applications. General proppant test parameters include sand size fraction percentages, roundness, sphericity, crush strength, and silica content. Standard measurement properties of proppants used in hydraulic fracturing and gravel-packing operations is defined in accordance with ISO 13503-2:2006/ Amd.1:2009E (International Standards, 2009).

9 Exploration

Exploration work conducted on the Wanipigow sand project by CPS consists exclusively of a September to December 2018 drill program, which is described in Section 10, Drilling.

Geological sampling and sand gradation analytical work associated with the drill program is described in Section 11, Sample Preparation, Analyses and Security.

Proppant characterization test work and results is discussed in Section 13, Mineral Processing and Metallurgical Testing.

10 Drilling

10.1 Drilling Prior to Canadian Premium Sand's 2018 Drill Program

Historical drilling at the Wanipigow Silica Sand Project is documented in Section 6, History, and includes:

- 1981: 12 diamond drillholes drilled by Manitoba Energy and Mines;
- 1992: 3 diamond drillholes drilled by Manitoba Energy and Mines;
- 2002: 2 diamond drillholes drilled by Claymore Kaolin Ltd. and Cando Contracting Ltd.
- 2004: 11 RC drillholes drilled by Gossan Resources.
- 2006: 23 auger drillholes drilled by Gossan Resources.
- 2008: 26 sonic drillholes drilled by Gossan Resources.
- 2010: 3 auger holes and 2 sonic drillholes drilled by Gossan Resources.

The authors have reviewed the documentation (namely drill logs and associated analytical results) associated with this historical drilling and has determined that the log information and/or sampling and analytical methodology is generally lacking the quantitative proppant protocol required for silica sand mineral resource/reserve estimations as per this Technical Report. Specific issues include: 1) an inability to obtain drill core material associated with the unconsolidated Winnipeg Formation sandstone; 2) differences in unit nomenclature in comparison to those used in this Technical Report; and 3) analytical datasets that are more-or-less limited to whole rock analysis (silica) rather than sandstone particle grain size distribution analysis.

Consequently, the historical drillhole data are used only as general references within the 3-D geological model. The historical drill data are in no way used as part of the resource/reserve estimation presented in this Technical Report, and therefore, the historical drilling is not discussed in further detail in Section 10, Drilling. The historical proppant characterization analysis (as conducted by independent and accredited laboratory, PropTester of Cypress, TX) is valid and worth reporting here in comparison with current API lab testing conducted by CPS, and therefore, is discussed in Section 13, Mineral Processing and Metallurgical Testing.

10.2 Canadian Premium Sand 2014 Drill Program

In 2014, Claim Post Resources Ltd. drilled 5 drillholes at the Property. The program consisted of 3 auger drillholes and 2 sonic drillholes. The program was unsuccessful due to: 1) the auger drill not being powerful enough to penetrate the Pleistocene glaciofluvial; and 2) the sonic drill yielding poor material recovery and not being able to drill deeper than approximately 10 m. Due to the drilling problems encountered, the program was cancelled with no adequate sample collection.

10.3 Canadian Premium Sand 2018 Drill Program

In September 2018, CPS commissioned: 1) Boart Longyear of Calgary, AB as a third-party drill contractor; and 2) APEX to provide independent geological and geotechnical support related to a 93-drillhole program to test and delineate the Wanipigow Silica Sand Project. The drill program was initiated on September 27, 2018 and completed on December 13, 2018.

The drill collar descriptions and location of the 93 drillholes is presented in Table 10.1 and Figure 10.1, respectively. A total of 1,573.7 m of drilling was completed. The drillhole nomenclature includes the company name (CPS), drill year (2018) and drillhole number (e.g., CPS18-001). Table 10.1 shows that the drillhole ID's have incremental gaps were holes were not drilled or in those locations where a hole location was re-drilled with a second hole as designated with an "A" at the end of the drill ID (e.g., CPS18-004A). A total of 9 holes were re-spudded and drilled due to drill complications in the original hole.

All holes were drilled on the Property using a track-mounted LS 250 mini sonic drill. A sonic drill rig was selected to obtain the most representative sample of the underlying sandstone-based geological units. All drillholes were drilled vertically at Azimuth 0° and dip -90°. The drilling pattern was orientated in a grid pattern and spaced 400 m apart. Infill drilling was periodically conducted at a drillhole spacing of 150 to 200 m.

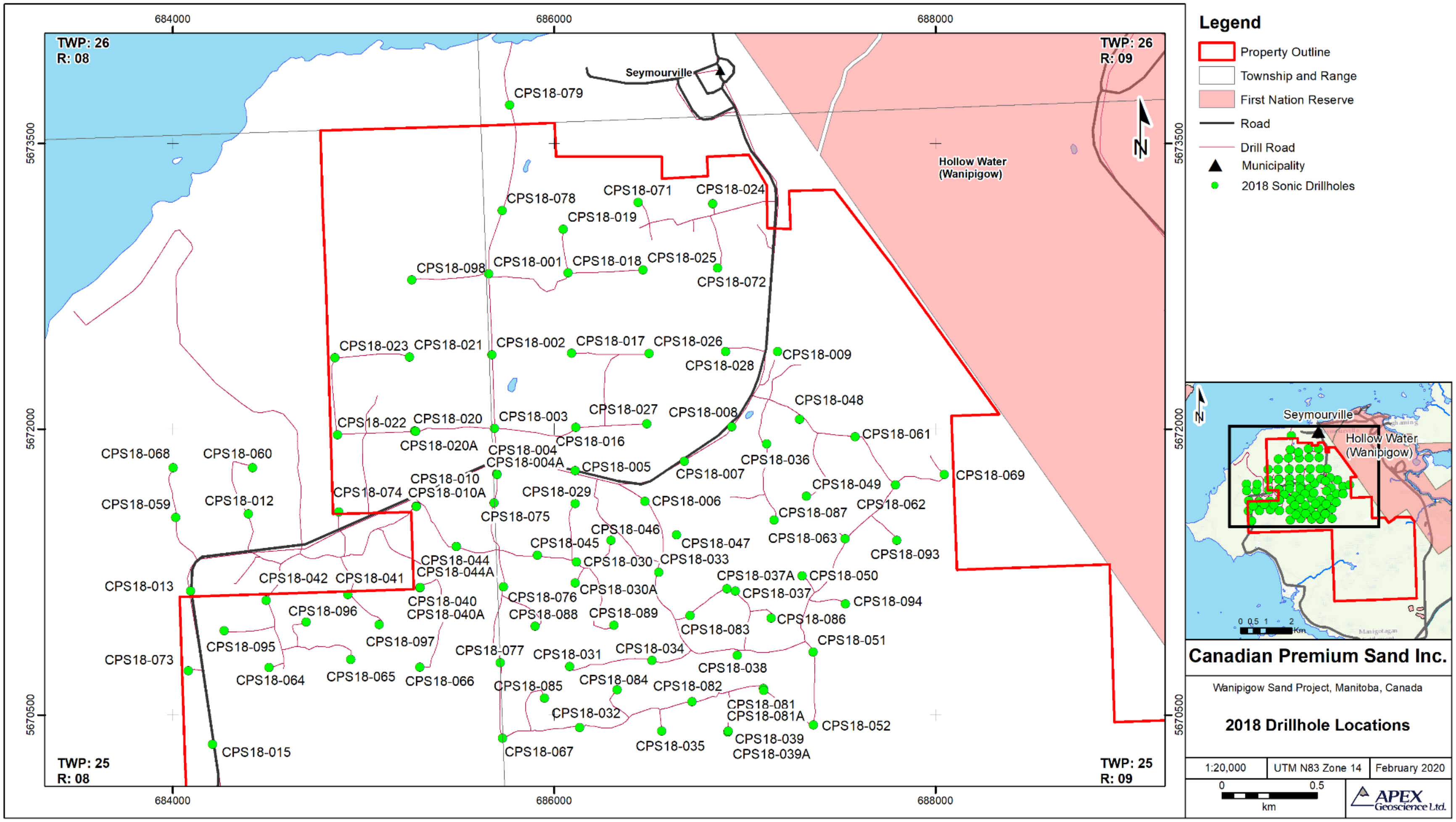
Table 10.1. Collar description of Canadian Premium Sand's 2018 drillhole program.

Drillhole ID	Easting (m) (UTM, Z12, NAD83)	Northing (m) (UTM, Z12, NAD83)	Elevation (m)	Adjusted elevation (m) [1]	Azi-muth (°)	Dip (°)	End of hole (m)
CPS18-001	685657	5672814	248	246.80	0	-90	18.9
CPS18-002	685673	5672390	249	247.27	0	-90	14.93
CPS18-003	685687	5672003	250	251.76	0	-90	22.5
CPS18-004	685699	5671764	252	252.49	0	-90	7.5
CPS18-004A	685700	5671762	250	252.48	0	-90	23.62
CPS18-005	686714	5671022	255	250.10	0	-90	21
CPS18-006	686477	5671620	252	249.45	0	-90	21
CPS18-007	686683	5671830	247	247.23	0	-90	10.5
CPS18-008	686932	5672012	253	247.40	0	-90	16
CPS18-009	687173	5672407	250	247.08	0	-90	25.5
CPS18-010	685278	5671595	246	253.37	0	-90	9
CPS18-010A	685278	5671594	255	253.38	0	-90	27
CPS18-011			Hole not drilled				
CPS18-012	684397	5671555	251	252.58	0	-90	21
CPS18-013	684094	5671149	240	249.20	0	-90	24
CPS18-014			Hole not drilled				
CPS18-015	684209	5670346	235	229.29	0	-90	12
CPS18-016	686114	5672008	255	249.36	0	-90	19
CPS18-017	686092	5672398	241	246.48	0	-90	18
CPS18-018	686073	5672819	246	248.82	0	-90	24
CPS18-019	686048	5673049	247	246.92	0	-90	19.5
CPS18-020	685269	5671990	248	248.79	0	-90	7.5
CPS18-020A	685273	5671988	245	248.84	0	-90	21
CPS18-021	685241	5672378	247	246.80	0	-90	21
CPS18-022	684864	5671970	247	247.53	0	-90	19.5
CPS18-023	684850	5672374	238	241.30	0	-90	13.5
CPS18-024	686832	5673183	246	248.92	0	-90	21
CPS18-025	686466	5672835	245	245.68	0	-90	15
CPS18-026	686498	5672397	246	246.12	0	-90	18
CPS18-027	686486	5672028	252	246.97	0	-90	18
CPS18-028	686899	5672406	242	248.71	0	-90	21
CPS18-029	686111	5671608	257	250.17	0	-90	23
CPS18-030	686118	5671302	248	248.65	0	-90	9.45
CPS18-030A	686111	5671192	246	248.24	0	-90	18
CPS18-031	686082	5670754	253	248.23	0	-90	21
CPS18-032	686135	5670434	239	242.27	0	-90	15
CPS18-033	686550	5671248	255	248.51	0	-90	16.5
CPS18-034	686514	5670785	248	249.47	0	-90	21
CPS18-035	686564	5670415	243	240.94	0	-90	12
CPS18-036	687115	5671923	244	245.72	0	-90	18
CPS18-037	686951	5671149	250	247.03	0	-90	18
CPS18-037A	686906	5671162	244	246.79	0	-90	21
CPS18-038	686960	5670813	256	250.02	0	-90	18
CPS18-039	686912	5670409	239	238.88	0	-90	7.5
CPS18-039A	686913	5670414	239	238.94	0	-90	7.5
CPS18-040	685296	5671167	249	246.10	0	-90	20
CPS18-040A	685297	5671168	249	246.11	0	-90	19.5
CPS18-041	684918	5671132	257	246.69	0	-90	19.5
CPS18-042	684490	5671101	248	247.51	0	-90	21
CPS18-043			Hole not drilled				
CPS18-044	685487	5671383	250	249.51	0	-90	7.5
CPS18-044A	685487	5671383	250	249.51	0	-90	22.5
CPS18-045	685913	5671338	248	248.87	0	-90	17.68
CPS18-046	686299	5671415	256	248.78	0	-90	19.5

Drillhole ID	Easting (m) (UTM, Z12, NAD83)	Northing (m) (UTM, Z12, NAD83)	Elevation (m)	Adjusted elevation (m) [1]	Azi-muth (°)	Dip (°)	End of hole (m)
CPS18-047	686643	5671445	243	247.00	0	-90	18
CPS18-048	687288	5672051	250	243.13	0	-90	12
CPS18-049	686323	5671647	242	246.04	0	-90	18
CPS18-050	687302	5671229	243	247.77	0	-90	15
CPS18-051	687358	5670829	252	242.51	0	-90	11.5
CPS18-052	687361	5670447	239	236.99	0	-90	12
CPS18-053			Hole not drilled				
CPS18-054			Hole not drilled				
CPS18-055			Hole not drilled				
CPS18-056			Hole not drilled				
CPS18-057			Hole not drilled				
CPS18-058			Hole not drilled				
CPS18-059	684016	5671536	249	247.52	0	-90	21
CPS18-060	684419	5671796	243	248.37	0	-90	21
CPS18-061	687579	5671960	245	243.72	0	-90	10.5
CPS18-062	687791	5671707	249	251.03	0	-90	18
CPS18-063	687527	5671425	247	249.79	0	-90	16.5
CPS18-064	684505	5670749	239	237.90	0	-90	12
CPS18-065	684934	5670791	235	236.97	0	-90	16.5
CPS18-066	685295	5670750	236	238.88	0	-90	18
CPS18-067	685730	5670378	246	237.69	0	-90	18
CPS18-068	684002	5671796	247	243.78	0	-90	21
CPS18-069	688046	5671762	243	243.73			9
CPS18-070			Hole not drilled				
CPS18-071	686440	5673189	244	250.18	0	-90	21
CPS18-072	686857	5672845	246	244.98	0	-90	21
CPS18-073	684081	5670732	237	237.17	0	-90	10.5
CPS18-074	684871	5671564	247	254.00	0	-90	25.5
CPS18-075	685685	5671613	248	251.55	0	-90	21
CPS18-076	685734	5671171	251	246.00	0	-90	15
CPS18-077	685718	5670774	250	244.72	0	-90	18
CPS18-078	685727	5673147	242	236.48	0	-90	9.93
CPS18-079	685766	5673700	233	229.96	0	-90	12
CPS18-080			Hole not drilled				
CPS18-081	687098	5670639	254	243.52	0	-90	12
CPS18-081A	687099	5670628	253	243.37	0	-90	15
CPS18-082	686724	5670569	246	244.50	0	-90	13.5
CPS18-083	686714	5671021	253	248.58	0	-90	15
CPS18-084	686330	5670632	251	246.96	0	-90	19
CPS18-085	685949	5670588	248	247.81	0	-90	18
CPS18-086	687138	5671007	252	251.39	0	-90	18.7
CPS18-087	687154	5671522	251	246.49	0	-90	15.5
CPS18-088	685900	5670965	248	246.31	0	-90	18
CPS18-089	686313	5670971	250	248.27	0	-90	18
CPS18-090			Hole not drilled				
CPS18-091			Hole not drilled				
CPS18-092			Hole not drilled				
CPS18-093	687797	5671415	242	244.61	0	-90	12
CPS18-094	687528	5671082	239	242.58	0	-90	9
CPS18-095	684270	5670941	243	243.29	0	-90	18
CPS18-096	684699	5670988	244	241.58	0	-90	15
CPS18-097	685082	5670974	237	239.89	0	-90	18
CPS18-098	685254	5672782	241	238.48	0	-90	13.5

[1] Collar elevation adjusted to Light Detection and Ranging (LiDar) bare earth surface topography.

Figure 10.1. Location of 2018 drillholes drilled by Canadian Premium Sands at the Wanipigow Silica Sand Project.



The drillhole collars were surveyed in the field using a Garmin 60CX handheld GPS that recorded Easting, Northing and Elevation data in UTM NAD 83 Zone 14 coordinates. The collar elevations were rectified afterwards using LiDar imagery to correctly position the vertical placement of the drill collar (Table 10.1).

Sonic coring was conducted from the surface collar through the entire targeted Winnipeg Formation and terminated in Precambrian Basement. As a sonic drill was used the coring from surface was not hampered by having to set drill casing in the upper portion of the drillhole (i.e., the entire stratigraphic unit was cored). Core retrieval was conducted in continuous 1.5 m intervals (the length of the core tube), and the core was 10.8 cm in diameter. The sample material was vibrated out of the core barrel and collected in plastic PVC tubes that were labeled with the hole ID, depth interval and core direction. The tubes were capped and sealed with duct tape and delivered to the core shack for detailed logging and sampling. Upon arrival at the core shack three to four tubes were placed in order on the table and opened by cutting the plastic. The core was photographed logged and sampled. Sampling procedures are presented in section 11, Sample Preparation, Analyses and Security.

A lithological summary of the drill logging is presented in Table 10.2 and Figures 10.2 and 10.3. Winnipeg Formation sandstone was intersected in 46 of the 93 drillholes with an additional 9 holes intersecting Pleistocene glaciofluvial material and "reworked" sandstone (i.e., potentially reworked Winnipeg Formation sand intermittent with glaciofluvial material). The thickness of the entire Winnipeg Formation ranged from 0.2 to 20.2 m. The strata are generally flat-lying, and hence, this thickness can be considered to represent the true thickness of the formation. In western Property drillholes where the thickest intersections of sandstone occurred, all three Winnipeg Formation members were present (UBI, PBS, LBI). In the eastern Property and in areas where the sandstone was less than 10 m thick, only the LBI member was present. A breakdown of the lithological logging results, as per Table 10.2, is as follows:

Lower Black Island (LBI): The LBI was intersected in 45 drillholes (or 48% of the 2018 drillholes; see Section 10, Drilling). The thickest LBI intersections were up to 15.9 m and averages 7.9 m.

Black Shale/Sandstone (BS): The BS was intersected in 14 drillholes (or 15% of the 2018 drillholes; see Section 10, Drilling). The thickest BS intersections were up to 3.5 m and averages 2.0 m when present.

Upper Black Island (UBI): The UBI was intersected in 22 drillholes (or 24% of the 2018 drillholes; see Section 10, Drilling). The thickest UBI intersections were up to 19.0 m and averages 4.6 m when present.

Pleistocene glaciofluvial (Pgf): Glaciofluvial material is more-or-less ubiquitous at the Property; only 7 drillholes, or 8% of the 2018 drillholes, did not intersect Quaternary material. The maximum thickness of the Pgf geo-unit is 23.6 m and averages 10.7 m when present.

Table 10.2. Lithological summary of core logging from CPS's 2018 drill program.

DDH	Easting (m) UTM N83 Z14	Northing (m) UTM N83 Z14	Pliestocene glaciofluvial thickness (m)	Upper Black Island thickness (m)	Pyritic Black Shale thickness (m)	Lower Black Island thickness (m)	Precambrian thickness (m)	End of Hole (m)
CPS18-001	685657	5672814	6.0	6.0	0.0	4.9	2.1	18.9
CPS18-002	685673	5672390	14.8	0.0	0.0	0.0	0.1	14.9
CPS18-003	685687	5672003	0.0	6.0	3.0	11.9	1.6	22.5
CPS18-004	685699	5671764	0.0	6.0	1.5	0.0	0.0	7.5
CPS18-004A	685700	5671762	0.0	6.0	3.0	14.0	0.6	23.6
CPS18-005	686110	5671782	12.6	0.0	0.0	5.5	2.9	21.0
CPS18-006	686477	5671620	0.0	19.0	0.0	0.0	2.0	21.0
CPS18-007	686683	5671830	9.8	0.0	0.0	0.0	0.8	10.6
CPS18-008	686932	5672012	15.0	0.0	0.0	0.0	1.0	16.0
CPS18-009	687173	5672407	23.6	0.0	0.0	0.0	1.9	25.5
CPS18-010	685278	5671595	0.0	7.5	0.0	0.0	1.5	9.0
CPS18-010A	685278	5671594	0.0	7.5	1.9	14.6	3.0	27.0
CPS18-012	684397	5671555	1.5	6.8	2.2	10.5	0.0	21.0
CPS18-013	684094	5671149	1.8	2.7	3.0	14.5	2.0	24.0
CPS18-015	684209	5670346	10.7	0.0	0.0	0.0	1.3	12.0
CPS18-016	686114	5672008	18.0	0.0	0.0	0.0	1.0	19.0
CPS18-017	686092	5672398	17.7	0.0	0.0	0.0	0.3	18.0
CPS18-018	686073	5672819	8.6	0.0	0.0	12.4	3.0	24.0
CPS18-019	686048	5673049	6.3	0.0	0.0	11.7	1.5	19.5
CPS18-020	685269	5671990	6.0	1.5	0.0	0.0	0.0	7.5
CPS18-020A	685273	5671988	6.5	2.3	1.7	9.1	1.4	21.0
CPS18-021	685241	5672378	15.0	0.0	0.0	4.5	1.5	21.0
CPS18-022	684864	5671970	3.7	0.9	1.4	12.3	1.2	19.5
CPS18-023	684850	5672374	11.6	0.2	0.0	0.2	1.5	13.5
CPS18-024	686832	5673183	7.5	0.0	0.0	11.5	2.1	21.0
CPS18-025	686466	5672835	4.4	0.0	0.0	9.1	1.5	15.0
CPS18-026	686498	5672397	15.0	0.0	0.0	0.0	3.0	18.0
CPS18-027	686486	5672028	16.5	0.0	0.0	0.0	1.5	18.0
CPS18-028	686899	5672406	20.3	0.0	0.0	0.0	0.7	21.0
CPS18-029	686111	5671608	21.0	0.0	0.0	0.0	2.0	23.0
CPS18-030	686118	5671302	9.5	0.0	0.0	0.0	0.0	9.5
CPS18-030A	686111	5671192	16.5	0.0	0.0	0.0	1.5	18.0
CPS18-031	686082	5670754	1.5	0.9	0.6	15.4	2.5	20.9
CPS18-032	686135	5670434	14.2	0.0	0.0	0.0	0.8	15.0
CPS18-033	686550	5671248	9.0	0.0	0.0	6.5	1.0	16.5
CPS18-034	686514	5670785	12.0	0.0	0.0	6.0	3.0	21.0
CPS18-035	686564	5670415	9.5	0.0	0.0	0.0	2.5	12.0
CPS18-036	687115	5671923	6.0	0.0	0.0	9.0	3.0	18.0
CPS18-037	686951	5671149	17.6	0.0	0.0	0.0	0.4	18.0
CPS18-037A	686906	5671162	18.0	0.0	0.0	0.0	3.0	21.0
CPS18-038	686960	5670813	9.0	0.0	0.0	6.0	3.0	18.0
CPS18-039	686912	5670409	6.0	0.0	0.0	0.0	1.5	7.5
CPS18-039A	686913	5670414	6.0	0.0	0.0	0.0	1.5	7.5
CPS18-040	685296	5671167	18.0	0.0	0.0	0.0	2.0	20.0
CPS18-040A	685297	5671168	18.0	0.0	0.0	0.0	1.5	19.5
CPS18-041	684918	5671132	3.0	0.0	1.5	14.2	0.8	19.5
CPS18-042	684490	5671101	1.5	1.1	2.1	13.4	2.9	21.0
CPS18-044	685487	5671383	7.5	0.0	0.0	0.0	0.0	7.5
CPS18-044A	685487	5671383	9.0	0.0	0.0	9.6	3.9	22.5
CPS18-045	685913	5671338	17.7	0.0	0.0	0.0	0.6	18.3
CPS18-046	686299	5671415	13.0	0.0	0.0	2.0	4.5	19.5
CPS18-047	686643	5671445	15.0	0.0	0.0	0.0	3.1	18.0
CPS18-048	687288	5672051	10.0	0.4	0.0	0.0	1.6	12.0
CPS18-049	687323	5671647	16.2	0.0	0.0	0.0	1.9	18.0
CPS18-050	687302	5671229	9.0	0.0	0.0	4.5	1.5	15.0
CPS18-051	687358	5670829	10.1	0.0	0.0	0.0	1.4	11.5
CPS18-052	687361	5670447	11.0	0.0	0.0	0.0	1.0	12.0
CPS18-059	684016	5671536	0.9	3.2	3.5	12.0	1.5	21.0
CPS18-060	684419	5671796	4.5	0.0	1.5	13.5	1.5	21.0
CPS18-061	687579	5671960	5.4	0.0	0.0	4.8	0.3	10.5
CPS18-062	687791	5671707	10.3	0.0	0.0	6.8	0.9	18.0
CPS18-063	687527	5671425	9.0	0.0	0.0	5.6	1.9	16.5
CPS18-064	684505	5670749	9.0	0.0	0.0	0.0	3.0	12.0
CPS18-065	684934	5670791	13.3	0.0	0.0	0.0	3.2	16.5
CPS18-066	685295	5670750	17.1	0.0	0.0	0.0	0.9	18.0
CPS18-067	685730	5670378	16.5	0.0	0.0	0.0	1.5	18.0
CPS18-068	684002	5671796	18.0	0.0	0.0	0.0	3.0	21.0
CPS18-069	688046	5671762	5.7	0.0	0.0	1.6	1.7	9.0
CPS18-071	686440	5673189	9.0	0.0	0.0	10.2	1.9	21.0
CPS18-072	686857	5672845	2.2	0.0	0.0	15.9	3.0	21.0
CPS18-073	684081	5670732	7.5	0.0	0.0	1.5	1.5	10.5
CPS18-074	684871	5671564	0.0	8.5	1.4	14.1	1.5	25.5
CPS18-075	685685	5671613	2.1	3.5	1.9	12.3	1.2	21.0
CPS18-076	685734	5671171	12.0	0.0	0.0	1.6	1.4	15.0
CPS18-077	685718	5670774	15.0	0.0	0.0	0.0	3.0	18.0
CPS18-078	685727	5673147	1.6	1.8	0.0	3.1	3.4	9.9
CPS18-079	685766	5673700	2.8	7.9	0.0	0.0	1.3	12.0
CPS18-081	687098	5670639	12.0	0.0	0.0	0.0	0.0	12.0
CPS18-081A	687099	5670628	13.1	0.0	0.0	0.0	1.9	15.0
CPS18-082	686724	5670569	12.9	0.0	0.0	0.0	0.6	13.5
CPS18-083	686714	5671021	10.1	0.0	0.0	4.9	0.1	15.0
CPS18-084	686330	5670632	18.0	0.0	0.0	0.0	1.0	19.0
CPS18-085	685949	5670588	12.0	0.0	0.0	3.0	3.0	18.0
CPS18-086	687138	5671007	15.0	0.0	0.0	2.2	1.5	18.7
CPS18-087	687154	5671522	14.0	0.0	0.0	0.0	1.5	15.5
CPS18-088	685900	5670965	10.9	0.0	0.0	5.5	1.7	18.0
CPS18-089	686313	5670971	11.6	0.0	0.0	3.4	3.0	18.0
CPS18-093	687797	5671415	9.0	0.0	0.0	1.5	1.5	12.0
CPS18-094	687528	5671082	8.5	0.0	0.0	0.0	0.5	9.0
CPS18-095	684270	5670941	15.0	0.0	0.0	0.0	3.0	18.0
CPS18-096	684699	5670988	13.1	0.0	0.0	0.0	1.9	15.0
CPS18-097	685082	5670974	17.1	0.0	0.0	0.0	0.9	18.0
CPS18-098	685254	5672782	9.0	2.3	0.0	0.7	1.5	13.5
		Minimum	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**7.5**
		Maximum	**23.6**	**19.0**	**3.5**	**15.9**	**4.5**	**27.0**
		Average (where present)	**10.7**	**4.6**	**2.0**	**7.9**	**1.7**	**16.9**
		Total	**930.6**	**102.0**	**30.2**	**357.3**	**154.3**	**1,574.3**

Figure 10.2 Occurrence of Winnipeg Formation silica sand in the 2018 drillholes.

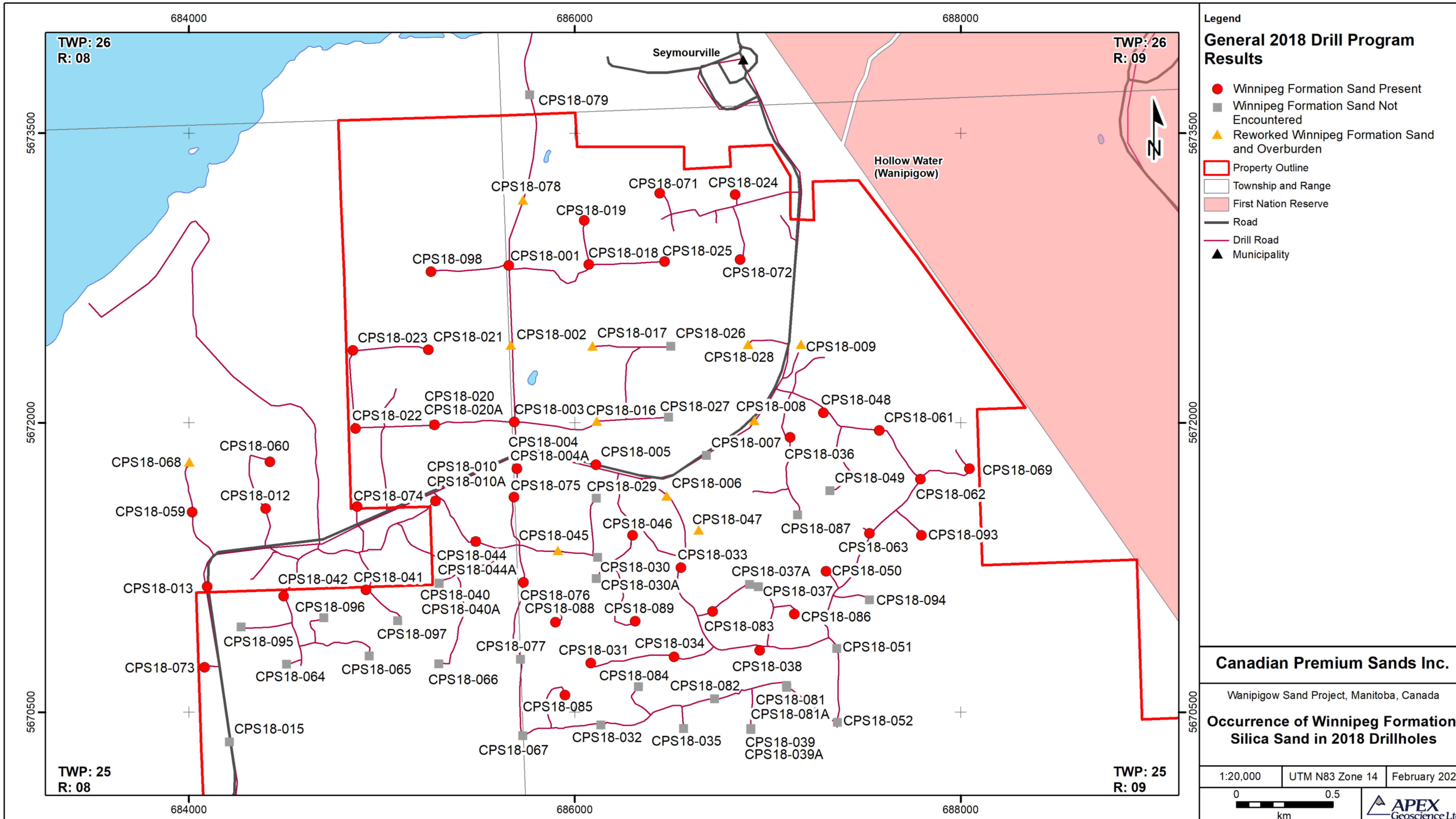
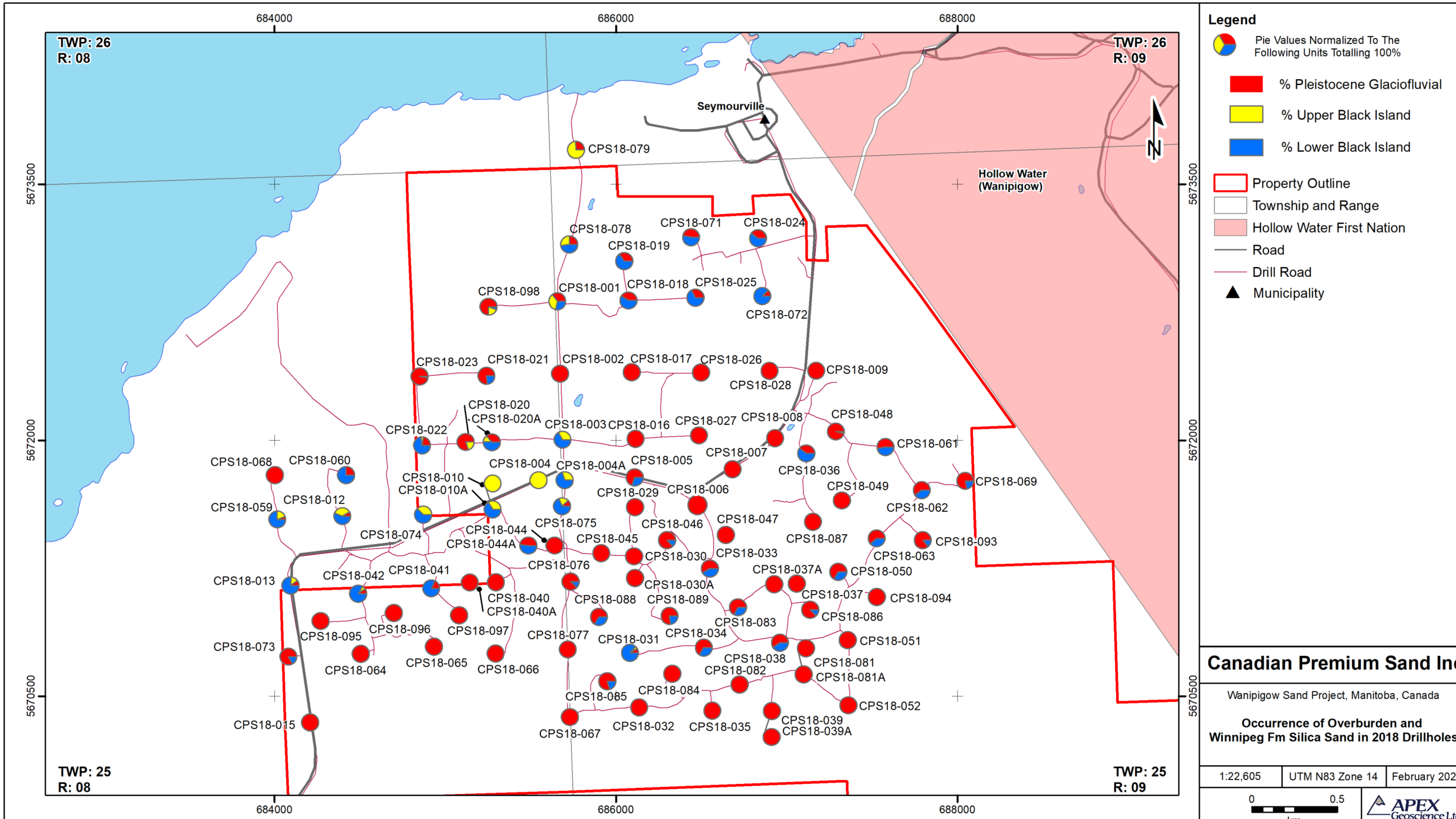


Figure 10.3 Normalized percentage of Pleistocene glaciofluvial, Upper Black Island and Lower Black Island thickness intersections in the 2018 drillholes.



Despite using a sonic drill rig to maintain core consistency, there were instances where it was not possible to recover 100% of the core. This occurred mostly in the uppermost Pleistocene glaciofluvial units due to large cobbles or boulders that became lodged in the core barrel and caused sand to wash away. In cases where significant core loss occurred within the target Winnipeg Formation, the hole was re-drilled. In these instances, the drill was collared directly adjacent to the original drillhole and re-drilled to acquire Winnipeg Formation sandstone at this Property grid coordinate.

The sonic drill and re-drilling approach were successful, and overall, the drill program sampling achieved a 94% recovery rate. The exception to the re-drilling process to obtain completed cores include:

- Drillhole CPS 18-059, which lost core within the Winnipeg Formation from 12-15 m depth; and

- Drillhole CPS 18-012, which lost core from 18-21m depth.

In both cases the drill rods in these 2 holes became stuck and the sample was lost due to the force exerted by the drill when the drillers attempted to remove them.

A total of 761 samples and 15 field duplicate samples were collected during the 2018 drill program. Of the 761 samples: 1) 450 are of Pleistocene glaciofluvial; 2) 57 from Upper Black Island or UBI; 3) 17 from Black Shale or BS; and 4) 237 from Lower Black Island or LBI. The samples are discussed in Section 11, Sample Preparation, Analyses and Security.

11 Sample Preparation, Analyses and Security

A total of 761 samples were collected and delivered to Turnkey Processing Solutions (TPS) in Ottawa, IL for analytical work. The samples included:

- 450 of Pleistocene glaciofluvial or surficial deposits consisting of glaciofluvial, glaciolacustrine and re-worked UBI material;

- 57 from Upper Black Island or UBI;

- 17 from Black Shale or BS; and

- 237 from Lower Black Island or LBI (Table 11.1).

In addition, Quality Assurance – Quality Control (QA-QC) samples were collected and analyzed to test precision and accuracy of duplicate sample pairs for gradation and crush resistance (and at multiple labs: TPS, Stim-Lab and Lonquist). The objective of this section is to describe the sample collection, preparation, chain-of-custody, analytical procedures and results of the QA-QC work.

Table 11.1 Summary of samples collected during the 2018 drill program. Abbreviations: Pgf – Pleistocene glaciofluvial; UBI – Upper Black Island; BS – Black Shale; and LBI – Lower Black Island.

	Number of Samples Collected From:				
Drill Hole ID	**Pgf**	**UBI**	**BS**	**LBI**	**Total**
CPS18-001	4	4	-	3	11
CPS18-002	8	-	-	-	8
CPS18-003	-	4	2	8	14
CPS18-004	-	4	-	-	4
CPS18-004A	-	4	2	8	14
CPS18-005	9	-	-	4	13
CPS18-006	14	-	-	-	14
CPS18-007	6	-	-	-	6
CPS18-008	11	-	-	-	11
CPS18-009	15	-	-	-	15
CPS18-010	-	6	-	-	6
CPS18-010A	-	5	1	10	16
CPS18-011	Hole not drilled				
CPS18-012	1	5[1]	1	5	12
CPS18-013	1	2	2	10	15
CPS18-014	Hole not drilled				
CPS18-015	5	-	-	-	5
CPS18-016	11	-	-	-	11
CPS18-017	9	-	-	-	9
CPS18-018	6	-	-	8	14
CPS18-019	4	-	-	8	12
CPS18-020	Not Sampled				
CPS18-020A	4	2	1	6	13
CPS18-021	9	-	-	3	12
CPS18-022	1	1	1	8	11
CPS18-023	6	-	-	1[2]	7
CPS18-024	3	-	-	8	11
CPS18-025	3	-	-	6	9
CPS18-026	6	-	-	-	6
CPS18-027	4	-	-	-	4
CPS18-028	12	-	-	-	12
CPS18-029	6	-	-	-	6
CPS18-030	5	-	-	-	5
CPS18-030A	5	-	-	-	5
CPS18-031	1	1[3]		11	13
CPS18-032	8	-	-	-	8
CPS18-033	6	-	-	4	10
CPS18-034	5	-	-	4	9
CPS18-035	Not Sampled				
CPS18-036	3	-	-	6	9
CPS18-037	7	-	-	-	7
CPS18-037A	8	-	-	-	8
CPS18-038	6	-	-	4	10
CPS18-039	4	-	-	-	4
CPS18-039A	Not Sampled				
CPS18-040	8	-	-	-	8
CPS18-040A	4	-	-	-	4
CPS18-041	2	-	1	10	13
CPS18-042	-	1	1	9[4]	11
CPS18-043	Hole not drilled				
CPS18-044	2	-	-	-	2
CPS18-044A	3	-	-	6	9
CPS18-045	4	-	-	-	4
CPS18-046	8	-	-	1	9

	Number of Samples Collected From:				
Drill Hole ID	**Pgf**	**UBI**	**BS**	**LBI**	**Total**
CPS18-047	11	-	-	-	11
CPS18-048	7	-	-	1	8
CPS18-049	4	-	-	-	4
CPS18-050	2	-	-	3	5
CPS18-051	2	-	-	-	2
CPS18-052	1	-	-	-	1
CPS18-053	Hole not drilled				
CPS18-054	Hole not drilled				
CPS18-055	Hole not drilled				
CPS18-056	Hole not drilled				
CPS18-057	Hole not drilled				
CPS18-058	Hole not drilled				
CPS18-059	1	2	2	6	11
CPS18-060	3	-	1	9	13
CPS18-061	1	-	-	3	4
CPS18-062	2	-	-	4	6
CPS18-063	2	-	-	4	6
CPS18-064	4	-	-	-	4
CPS18-065	6	-	-	-	6
CPS18-066	9	-	-	-	9
CPS18-067	10	-	-	-	10
CPS18-068	11	-	-	-	11
CPS18-069	1	-	-	1	2
CPS18-070	Hole not drilled				
CPS18-071	6	-	-	7	13
CPS18-072	1	-	-	11	12
CPS18-073	1	-	-	1	2
CPS18-074		6	1	9	16
CPS18-075	1	3[5]	1	8	13
CPS18-076	8	-	-	1	9
CPS18-077	9	-	-		9
CPS18-078	1	1	-	2	4
CPS18-079	1	5	-		6
CPS18-080	Hole not drilled				
CPS18-081	10	-	-	-	10
CPS18-081A	Not Sampled				
CPS18-082	12	-	-	-	12
CPS18-083	8	-	-	4	12
CPS18-084	11	-	-		11
CPS18-085	7	-	-	2	9
CPS18-086	5	-	-	2	7
CPS18-087	7	-	-	-	7
CPS18-088	5	-	-	4	9
CPS18-089	8	-	-	2	10
CPS18-090	Hole not drilled				
CPS18-091	Hole not drilled				
CPS18-092	Hole not drilled				
CPS18-093	4	-	-	1	5
CPS18-094	1	-	-	-	1
CPS18-095	6	-	-	-	6
CPS18-096	6	-	-	-	6
CPS18-097	4	-	-	-	4
CPS18-098	4	1	-	1	6

1 One sample is a mix of 75% UBI and 25% BS
2 Sample is a mix of 15% OB, 10% UBI and 75%LBI
3 Sample contains 15% BS 85% UBI
4 One sample is a mix of 15% BS and 85% LBI
5 Sample contains 15% BS 85% UBI

11.1 Sample Collection, Preparation and Security

The following sample collection protocol was followed during CPS's 2018 drill program at the Wanipigow Sand Project:

- Core samples were collected from all sonic drillholes that recovered subsurface geological material, including 3 subunits of the Winnipeg Formation as allocated in this study (LBI, BS and UBI) and the overlying Pleistocene glaciofluvial (Pgf).

- The primary sampling objective for the Wanipigow Sand Project was to collect a sample from all subsurface lithological materials that had a sand content of greater than 30%, omitting visual geological horizons that had a high modal abundance of clay, mudstone or shale.

- The Pleistocene glaciofluvial and bedrock samples were collected in 1.5 m increments; occasionally, it was necessary to shorten or lengthen the channel sample length based on lithological changes (i.e., geological contacts).

- In instances were geological contacts influenced the sample stream, short sample increments were collected up to the contact (if necessary) at which point a new 1.5 m sample run was initiated downhole from the new lithological unit.

- Of the sample lengths that do not conform to the standard 1.5 m sample length standard, the minimum and maximum sample lengths were 0.40 m and 2.60 m.

- The initial core geotechnical work included:

    - Removing the core sample from the sonic core barrel in its plastic 'sleeve' and lay the core out on a flat surface;

    - Cut and remove the plastic sleeve in a manner that did not degrade the integrity of the drill core;

    - Photograph the core in its 'original' state;

    - Measure the core and document any areas of lost core;

    - Log the core using the lithological units described in Section 7.2, Property Geology.

    - Prepare the core for sampling by splitting the core along the length of the sample with a putty knife into 3 representative 'channel' samples or splits.

- 1.5 m composite channel samples for each of the core splits (n=3 samples/1.5 m core length) were placed into separate plastic bags labelled with: 1) sample ID; 2) drill hole ID; and 3) sample interval. The sample interval included the sample designation; that is, the 3 splits were designated as:

  - 'TPS Lab samples', which were shipped to TPS for gradation and/or proppant characterization testing;
  - 'Archive samples' to be archived internally by CPS; and
  - 'Internal samples' to be archived internally by CPS for future check-work or QA-QC work;

- A minimum of 2.0 kg of sandy substrate material was collected in all core split samples.

- Sample ID's were recorded on the outside and inside of the sample bag. Inside sample ID's were done inserting a waterproof sample ID tag into each bag. Internal and external sample ID's were constructed at the same time to ensure both tags were given identical sample ID's.

- All 3 sample bags (representing lab, internal and reference samples from a single sample site) were sealed with a cable tie.

- Samples designated as lab samples were loaded into plywood shipping crates by APEX geologists who maintained the chain of custody from the core sample site to camp to the laboratory (TPS). The crate was then sealed, and tamper evident security tape was affixed to four sides. The crate seals were then photographed.

- The shipping crate was picked up from the core shack by Gardewine Transport from Winnipeg, MB and delivered to TPS to undergo laboratory test work (gradation and proppant characterization testing).

- All core logging data including collar location, geological observations and sample information was captured on paper logs and then transferred to a digital format by APEX geologists.

- The digital logs were checked for accuracy before being imported into the MicroMine drill database, which was then re-validated in MicroMine to be used in the resource.

In addition to these 3 sample splits that were collected for every approximately 1.5 m of core, a 4th sample called a 'reference sample' was collected randomly approximately every 50 samples to serve as a representative field duplicate. The reference sample was collected using the identical sampling procedure as the other samples but was placed in a bag labelled with only a sample id. In total 15 field duplicates were taken during the

2018 drill program. Samples designated as reference samples were placed into labelled plastic crates and stored onsite in a locked sea can.

With respect to chain of custody of the samples, APEX geologists managed the entire sample collection process including: logging and sampling; onsite sample management; and overseeing loading the samples on a transport truck to be sent to the laboratory (TPS).

In addition, APEX geologists managed archival, internal and reference samples and ensured the sample were properly documented, sealed and stored at CPS's onsite storage facility. Lastly, QA-QC chain-of-custody included samples that were: 1) collected by APEX and sent directly to Stim-Lab; or 2) sample splits recommended by APEX were sent directly from TPS to Stim-Lab. Either way, the QA-QC samples were maintained by persons independent to CPS.

11.2 Analytical Procedures

11.2.1 Gradation Analysis

At TPS, the lab sample splits (n=761 samples) were washed, dried and a subset split of the sample was analyzed using a Camsizer P4 Particle analyzer for gradation analysis. The Camsizer uses dynamic image analysis to conform to ISO 13322-2 and characterize dry free-flowing bulk materials. The Camsizer P4 simultaneously measures particle size and shape at high resolution.

The resulting TPS Camsizer sieve results are reported in the following mesh size fractions: 16 (1.180 mm), 20 (850 µm), 25 (710 µm), 30 (600 µm), 35 (500 µm), 40 (425 µm), 45 (355 µm), 50 (300 µm), 60 (250 µm), 67.5 (221 µm), 70 (212 µm), 80 (180 µm), 100 (150 µm), 120 (125 µm), 137.5 (108 µm), 140 (106 µm), 200 (74 µm) and Pan (< 74 µm). These data were used to create an 'assay' database that was utilized in the resource estimation presented in this Technical Report (see Section 14, Mineral Resource Estimate).

In addition to the 761 lab samples, a total of 33 field duplicate samples were analyzed at TPS using 'anonymous' sample ID's as designed by APEX. The analyses were conducted using the identical analytical procedure as the 761-sample stream. The test work was conducted to test the precision of the gradation work conducted at TPS on duplicate, but anonymous, samples.

Lastly, 14 duplicate samples were sent to Stim-Lab who completed both gradation analysis and proppant characterization test work. The objective of this test work is QA-QC on proppant characterization between laboratories (see Sections 11.2.2, 11.4.2 and 11.4.3).

11.2.2 Proppant Characterization

To date, TPS has conducted Krumbein shape factor (roundness and sphericity) measurements and crush resistance tests on 40/70 and 70/140 fractions. In total, 665 Krumbein shape factor and crush resistance tests were conducted on: 1) single 1.5 m samples (i.e., the lab samples); and/or 2) on composite groupings of samples.

The composite samples include a wide variety of stratigraphically contiguous samples that span up to approximately 21 m of strata. Some of the composite samples occur within a single lithological unit (e.g., LBI) while other span multiple lithological units.

Of the 2018 crush test work conducted to date at TPS:

- 263 tests were performed on LBI sand;
- 2 on the BS unit;
- 8 on UBI sand;
- 209 on Pgf, or Pleistocene glaciofluvial; and
- 173 tests performed on multi-unit composite samples.

In addition to crush test analysis, the 14 bulk samples sent to Stim-Lab discussed in the previous sub-section (Section 11.2.1) and a set of 16 samples sent to Lonquist were also analyzed for a full-suite of proppant characterization tests. This includes: Krumbein shape factors; acid solubility; and turbidity (in addition to crush resistance test work). The results of the TPS, Stim-Lab and Lonquist proppant test work is presented in Section 13, Mineral Processing and Metallurgy. The analytical procedure is described in the following text. Where applicable, QA-QC analytical results are discussed in Section 11.4.

Sphericity is the measure of how spherical a given proppant particle is. Roundness is the measure of the lack of sharp edges or angularity. Proppants must be highly spherical and well-rounded to maximize interstitial space between adjacent proppant particles to allow passage of oil, gas, condensate, etc., through the proppant pack.

Crush Resistance is a measurement of the strength of a mass of screened, fines-free dry proppant to force applied over a fixed cross-sectional area, providing an equivalent stress to the proppant under test. The mass of proppant introduced to the crush cylinder is a function of its bulk density and the specified loading of 4.0 pounds per cubic foot. The load is applied in a controlled rate and held at the final test stress level for 2.0 minutes. The mass is re-screened to determine the number of fines generated by the applied stress, and the highest stress attained without producing more than 10.0% fines is the "K Number". E.g., if a Crush Resistance test yields 9.78% fines at 10,000 psi and 10.44% fines at 11,000 psi, the K Number (K=1000) of that proppant would be "10K," because the generated fines were below 10.0% at 10,000 psi (10K psi) and exceeded 10% at 11,000 psi.

As a QA-QC measure on the crush resistance test work, APEX recommended additional proppant characterization test work be conducted at Stim-Lab. This work included further testing on two separate split sets of 14 samples as described below:

1. A crush resistance laboratory check (n=14 sample fraction splits) in which Stim-Lab analyzed pre-washed 40/70 and 50/140 crush tests that were originally separated and analyzed for crush strength at TPS; and

2. An identical set (i.e., same sample ID's) of 14 bulk samples for independent crush resistance test work at Stim-Lab. I.e., this sample set was not pre-washed and/or sieve separated at TPS. The crush tests were also conducted on the 40/70 and 50/140 fractions.

Acid Solubility is a mass loss (gravimetric) test method that determines the degree of solubility of natural sand in a 12:3 blend of Hydrochloric and Hydrofluoric acids. The technique measures the resistance of potential proppant contaminants to acid attack, which may negatively affect proppant performance.

Turbidity is a method using transmittance or reflectance of light to measure the number of fines that are <200 mesh in diameter, including clay, silt, proppant fines, etc. A fixed mass of proppant is added to a fixed mass of deionized water, agitated, and the water is drawn off and measured in a turbidity meter.

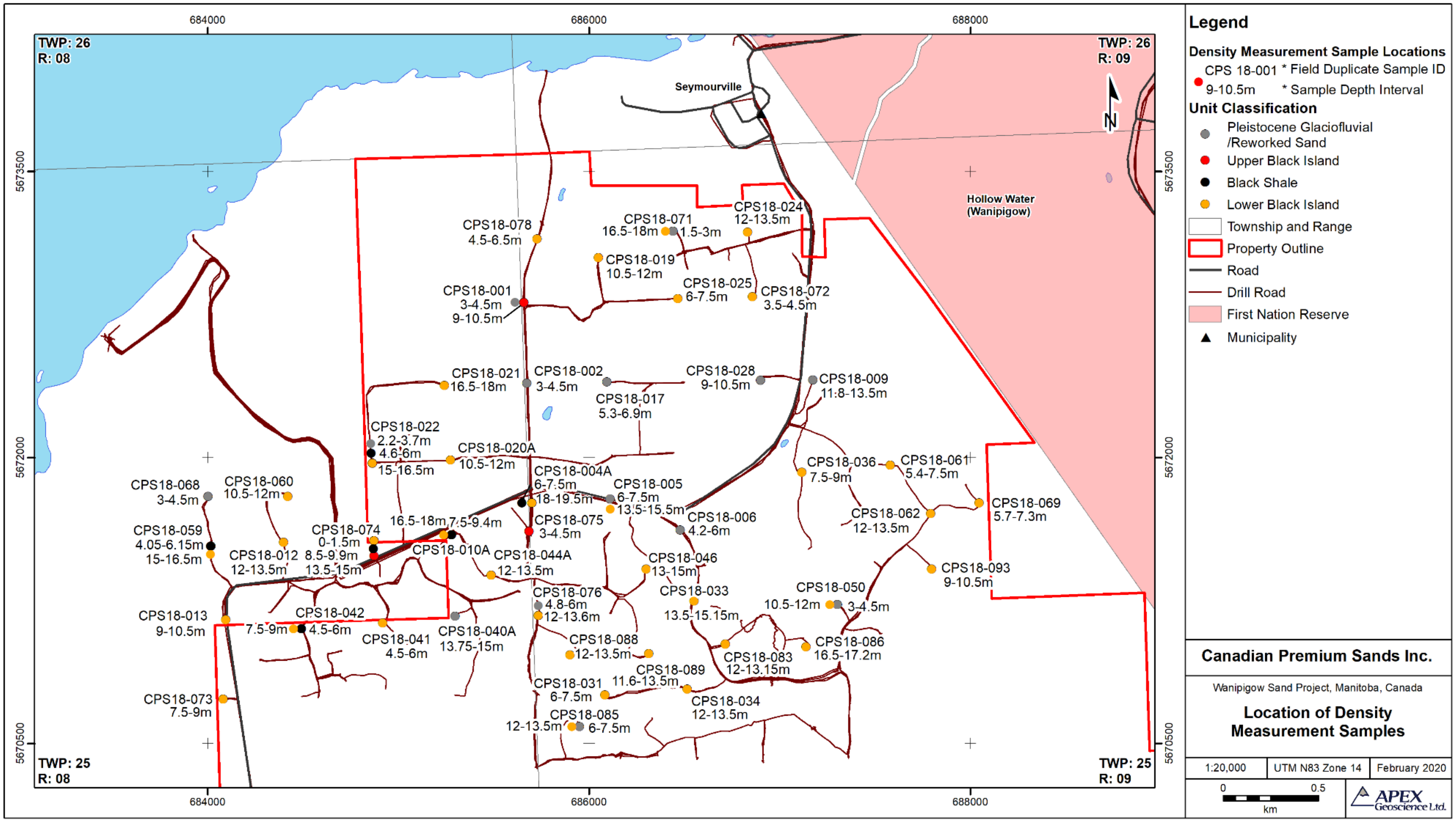
11.2.3 Bulk Density Measurements

A subset sample split of the 58 samples were collected and sent to Stim-Lab in Duncan, Oklahoma for ISO 13503-2 standard loose-sand bulk density analysis. Loose bulk density is the unit mass of an untapped or unsettled proppant that will occupy a specific known volume; e.g., how many grams per cubic centimeter. Bulk Density includes both the mass of the proppant and the volume of air occupying the interstitial spaces between proppant particles. The bulk density sample drillhole locations is presented in Figure 11.1. The 58 samples selected for density measurements included: 13 samples of Pleistocene glaciofluvial and/or reworked UBI sand; 3 samples of UBI; 6 samples of BS; and 36 samples of LBI.

11.2.4 Long-Term Conductivity and Permeability

A subset 40/70 and 50/140 fraction sample split of LBI sand was analyzed at Stim-Lab for long-term conductivity and permeability. The measurements were conducted in compliance with APIRP19D, which is the guideline procedure used for testing the long-term conductivity of proppant.

Figure 11.1 Location of drillholes in which selected samples were collected for loose bulk density measurements.



The conductivity and permeability data was acquired using the following specifications:

1. Conductivity was measured at 2000, 4000, 6000, 8000, and 10,000 psi closure stress at 150 °F.

2. The test fluid for the conductivity testing was 2% KCl. Flow rates are controlled with a Bronkhorst Liqui-Flow® mass flow meter/controller. The test flow rates were cycled at ~2 mL/min, ~3 mL/min, ~3 mL/min, ~3 mL/min, and ~2 mL/min or to maintain a ΔP of at least a minimum of 0.002 psi. Each rate was maintained for 3 minutes. After the 15-minute cycle, the cell is switched to the next cell in the test series and the cycle repeated. During the non-monitoring time, the other cells are held at a constant flow of ~2 mL/min. Once data is collected on all cells, the cycle returns to the first cell in the test series and the above protocol continued. This schedule is maintained throughout the 50 hours of data collection at each stress.

3. Pack widths are measured every 5 hours and recorded as described in the 'Width Measurement' section.

4. The transducer zero is checked every 5 hours and if necessary is re-zeroed with a HART 475 Field Communicator.

5. The raw data is monitored in real time saving one point every 10 seconds. The relevant data collected is as followed: Flow rate (mL/min), Δ*P* (psi), and Temperature (°F). These are used with the Conductivity Equation ("Data Processing to Arrive at Conductivity and Permeability Values") to arrive at the calculated conductivity value.

In order to correct for the temperature effect on viscosity of 2% KCl, the Laliberté (2007) equation was utilized.

11.3 Laboratory Accreditations

Turnkey Processing Solutions is a third-party independent lab that provides mineral processing solutions for the mining, sand, aggregate, and bulk material handling industries. The analytical work is reviewed and approved by a Professional Engineer and the analytical methods carried out by the laboratory is standard and routine in the field of silica sand and proppant characterization test work and are pursuant to ISO 13503-2.

Stim-Lab is a third-party independent lab that has certified Professional Engineers and cite recognized ASTM specification for laboratory preparation, analysis and reporting (i.e., ISO 17025:2005 in North America offering ISO 13503-2, ISO 13503-5, API RP19C and API RP56 tests for sand resin coated sand and engineered ceramic proppants).

Lonquist Frac Sand Services is a third-party independent lab with offices throughout North America that have been providing testing services to the sand, aggregate, and evaporite mining industries since 2011 and frac sand testing services meet API and ISO standards.

11.4 Bulk Density Results

The individual loose bulk density measurements are presented in Table 11.2 and a summary of results with the loose bulk sand being converted to a compacted bulk sand is presented in Table11.3.

The average 'loose' sand bulk densities range from 1.395 g/cm^3 to 1.470 g/cm^3 for the Black Shale and Upper Black Island geo-units, respectively. The Black Shale geo-unit has a distinct bulk density in comparison to the Pgf, LBI and UBI geo-units, which have similar loose bulk densities when rounded off to the nearest hundredths decimal place (e.g., 1.46, 1.47 and 1.44 g/cm^3; Table 11.3).

This supports the contention that the Pgf contains some component of UBI sand; particularly when the lithological descriptions of the Pgf and their corresponding loose bulk densities are reviewed in Table 11.2. The Pgf sand with a potential component of reworked UBI sand has significantly higher bulk densities than the PGF with silty-sand and clay components.

Obtaining an *in-situ* bulk density of the Winnipeg Formation was not possible. Alternatively, the authors convert the loose bulk density to a 'compacted', or *in-situ*, bulk density by utilizing a 30% bulk factor. The 30% bulking factor is appropriate when converting loose clean sand to an in-place sand and/or sandstone bedrock (with gravel and/or clay components) (e.g., Church, 1981; Hartman, 1992; Wilkinson, 1997; Ofoegbu et al., 2008; The Engineering ToolBox, 2009; Mr. R. Farmer, pers. comm., 2019). Utilizing the loose densities with a 30% bulking factor provides *in-situ* bulk densities as follows:

1. Pleistocene glaciofluvial and/or reworked UBI sand average *in-situ* bulk density of 1.897 g/cm^3 (n=13 density measurements);

2. Upper Black Island sand average *in-situ* bulk density of 1.911 g/cm^3 (n=3 density measurements); and

3. Lower Black Island sand average *in-situ* bulk density of 1.878 g/cm^3 (n=36 density measurements; Table 11.3).

The density of North America silica sand ranges from 1.6 to 2.6 g/cm^3 with average bulk densities of 1.84 g/cm^3 (Veatch et al., 2017) to 1.91 g/cm^3 (Mr. R. Farmer, pers. comm., 2019). The *in-situ* bulk density values determined in the current study is in accordance with other authors findings and therefore acceptable for use in the resource evaluation work presented in this Technical Report.

Table 11.2 Summary of individual loose bulk density results.

Original Sample ID	Hole ID	From (m)	To (m)	Lithology	Bulk loose density (g/cm^3)	Bulk loose density (lb/ft^3)	Lithological description
573183	CPS18-004A	6.00	7.50	BS	1.270	79.20	Black Shale
573198	CPS18-010A	7.50	9.40	BS	1.380	86.10	Black Shale+Sand
576653	CPS18-022	4.60	6.00	BS	1.440	89.90	Black Shale
573484	CPS18-042	4.50	6.00	BS+LBI	1.440	89.90	Black Shale+Sand
725156	CPS18-059	4.05	6.15	BS	1.430	89.20	Black Shale
556605	CPS18-074	8.50	9.90	BS	1.410	88.00	Black Shale+Sand
573191	CPS18-004A	18.00	19.50	LBI	1.510	94.20	LBI- Sand
576519	CPS18-005	13.50	15.50	LBI	1.400	87.40	LBI- Sand
573205	CPS18-010A	16.50	18.00	LBI	1.350	84.20	LBI- Sand
725138	CPS18-012	12.00	13.50	LBI	1.430	89.20	LBI- Sand
725102	CPS18-013	9.00	10.50	LBI	1.390	86.70	LBI- Sand
576682	CPS18-019	10.50	12.00	LBI	1.320	82.40	LBI- Sand
576669	CPS18-020A	10.50	12.00	LBI	1.460	91.10	LBI- Sand
576641	CPS18-021	16.50	18.00	LBI	1.520	94.80	LBI- Sand
576660	CPS18-022	15.00	16.50	LBI	1.380	86.10	LBI- Sand
725196	CPS18-024	12.00	13.50	LBI	1.410	88.00	LBI- Sand
576692	CPS18-025	6.00	7.50	LBI	1.330	83.00	LBI- Sand
573291	CPS18-031	6.00	7.50	LBI	1.360	84.90	LBI- Sand
573360	CPS18-033	13.50	15.15	LBI	1.470	91.70	LBI- Sand
573305	CPS18-034	12.00	13.50	LBI	1.450	90.50	LBI- Sand
576770	CPS18-036	7.50	9.00	LBI	1.410	88.00	LBI- Sand
576588	CPS18-041	4.50	6.00	LBI	1.420	88.60	LBI- Sand
573486	CPS18-042	7.50	9.00	LBI	1.460	91.10	LBI- Sand
573436	CPS18-044A	12.00	13.50	LBI	1.390	86.70	LBI- Sand
573448	CPS18-046	13.00	15.00	LBI	1.390	86.70	LBI- Sand
573257	CPS18-050	10.50	12.00	LBI	1.530	95.50	LBI- Sand
725162	CPS18-059	15.00	16.50	LBI	1.380	86.10	LBI- Sand
725124	CPS18-060	10.50	12.00	LBI	1.460	91.10	LBI- Sand
573268	CPS18-061	5.40	7.50	LBI	1.470	91.70	LBI- Sand
573262	CPS18-062	12.00	13.50	LBI	1.510	94.20	LBI- Sand
573266	CPS18-069	5.70	7.30	LBI	1.460	91.10	LBI- Sand
725176	CPS18-071	16.50	18.00	LBI	1.480	92.40	LBI- Sand
725180	CPS18-072	3.50	4.50	LBI	1.450	90.50	LBI- Sand
573495	CPS18-073	7.50	9.00	LBI	1.480	92.40	LBI- Sand
556608	CPS18-074	13.50	15.00	LBI	1.460	91.10	LBI- Sand
573218	CPS18-076	12.00	13.60	LBI	1.460	91.10	LBI- Sand
573140	CPS18-078	4.50	6.50	LBI	1.500	93.60	LBI- Sand
573348	CPS18-083	12.00	13.15	LBI	1.510	94.20	LBI- Sand
576555	CPS18-085	12.00	13.50	LBI	1.490	93.00	LBI- Sand
573465	CPS18-088	12.00	13.50	LBI	1.520	94.80	LBI- Sand
573457	CPS18-089	11.60	13.50	LBI	1.440	89.90	LBI- Sand
576764	CPS18-093	9.00	10.50	LBI	1.550	96.70	LBI- Sand
573120	CPS18-002	3.00	4.50	Pgf	1.530	95.50	Pgf Reworked Sand
576513	CPS18-005	6.00	7.50	Pgf	1.420	88.60	Pgf Reworked Sand
573375	CPS18-006	4.20	6.00	Pgf	1.490	93.00	Pgf Reworked Sand
573411	CPS18-009	11.80	13.50	Pgf	1.430	89.20	Pgf Reworked Sand
576726	CPS18-017	5.30	6.90	Pgf	1.550	96.70	Pgf Sand/gravel
576651	CPS18-022	2.20	3.70	Pgf	1.540	96.10	Pgf-Clay
576741	CPS18-028	9.00	10.50	Pgf	1.490	93.00	Pgf Reworked Sand
573469	CPS18-040A	13.75	15.00	Pgf	1.590	99.20	Pgf Sand
573254	CPS18-050	3.00	4.50	Pgf	1.500	93.60	Pgf Clay+Gravel
725144	CPS18-068	3.00	4.50	Pgf	1.390	86.70	Pgf Reworked Sand
725166	CPS18-071	1.50	3.00	Pgf	1.440	89.90	Pgf Silty Sand
573213	CPS18-076	4.80	6.00	Pgf	1.230	76.80	Pgf Sand+Clay
576551	CPS18-085	6.00	7.50	Pgf	1.370	85.50	Pgf Sand+Clay
573132	CPS18-001	9.00	10.50	UBI	1.510	94.20	UBI-Sand
556599	CPS18-074	0.00	1.50	UBI	1.500	93.60	UBI-Sand
573168	CPS18-075	3.00	4.50	UBI	1.400	87.40	UBI-Sand

Table 11.3 Summary of loose and compacted bulk densities. The grey shaded densities are used in the resource estimations presented in this Technical Report.

Lithology	Count	Average loose bulk density (g/cm^3)	Average compacted bulk density (g/cm^3) [1]	Average loose bulk density (lb/ft^3)	Average compacted bulk density (lb/ft^3) [2]
Pleistocene glaciofluvial	13	1.459	1.897	91.097	118.426
Black Shale	6	1.395	1.814	87.087	113.213
Upper Black Island	3	1.470	1.911	91.769	119.300
Lower Black Island	36	1.444	1.878	90.174	117.226

[1] Utilizing a 30% bulking factor (Mr. R. Farmer, pers. comm., 2019).
[2] 1 g/cm3 = 62.428 lb/ft3.

11.5 Quality Assurance – Quality Control

11.5.1 Field Duplicate Gradation QA-QC (Particle Grain Size Distribution Test)

The field duplicate test work was conducted to test the gradation analytical work conducted at TPS (n=33 field duplicates). The original lab samples were analyzed at TPS. APEX then collected an additional 33 field duplicates,15 of which included material from the reference sample splits plus an additional 18 samples from the internal samples (or CPS archive material). The duplicate samples were collected on January 22, 2019 by Ms. Hough, placed in a plastic bag labelled with a unique sample ID (i.e., other than the original sample ID) and shipped via FEDEX to TPS for gradation testing.

The field duplicate samples included: 11 Pleistocene glaciofluvial and reworked sand samples; 1 UBI sample; and 21 samples of LBI. The results of the original gradation analyses versus the field duplicate gradation analyses are presented in Figures 11.2 and 11.3. These two figures show the gradation comparison by:

1. Size fractions (Figure 11.2; i.e., 20/40, 30/50, 40/70, 50/140 and 70/140); and by

2. Individual sieve mesh sizes (Figure 11.3; i.e., 16, 20, 25, 30, 35, 40, 45, 50, 60, 67.5, 70, 80, 100, 120, 137.5, 140, 200 and Pan or -200 mesh sizes).

The comparison between the original and duplicate gradation analyses show good to excellent correlation (Figures 11.2 and 11.3). Two of the 33 QA-QC gradation comparisons yield poor correlation results: CPS18-017 versus F-Dup-029 (Figure 11.2.AC), which may be attributed to Pleistocene glaciofluvial unpredictability and CPS18-063 versus F-Dup-033 (Figure 11.2.AG), which is an excellent sample of LBI and therefore the poor correlation may be attributed to analytical or data entry errors. Nevertheless, this QA-QC test enables the authors to have a high level of confidence in the gradation data, which in turn, provides confidence of the 'assay' dataset used in the resource estimation presented in this Technical Report.

Figure 11.2 Comparison of original gradation analyses versus field duplicate gradation analyses. Presented as size fractions.

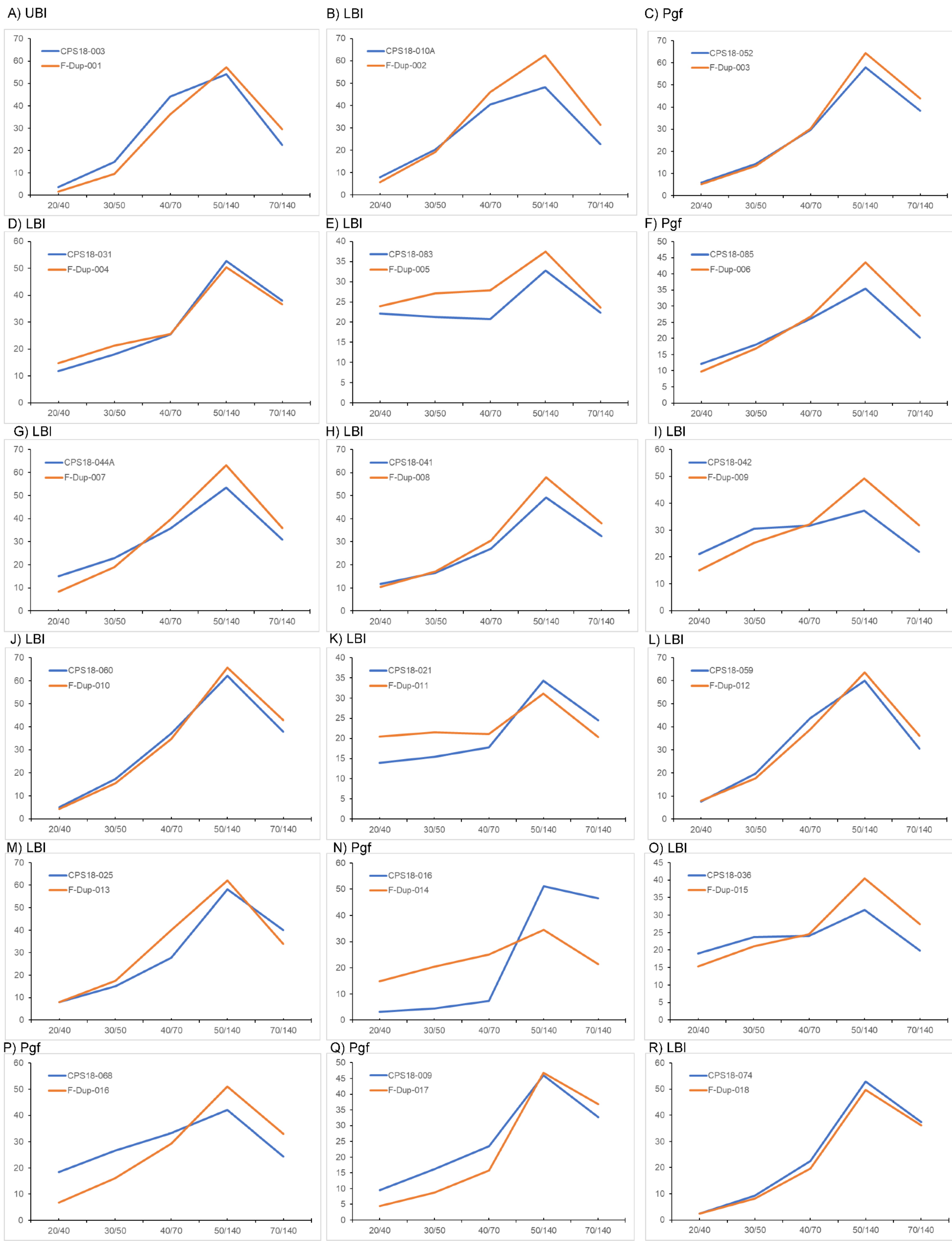


Figure 11.2, Continued.

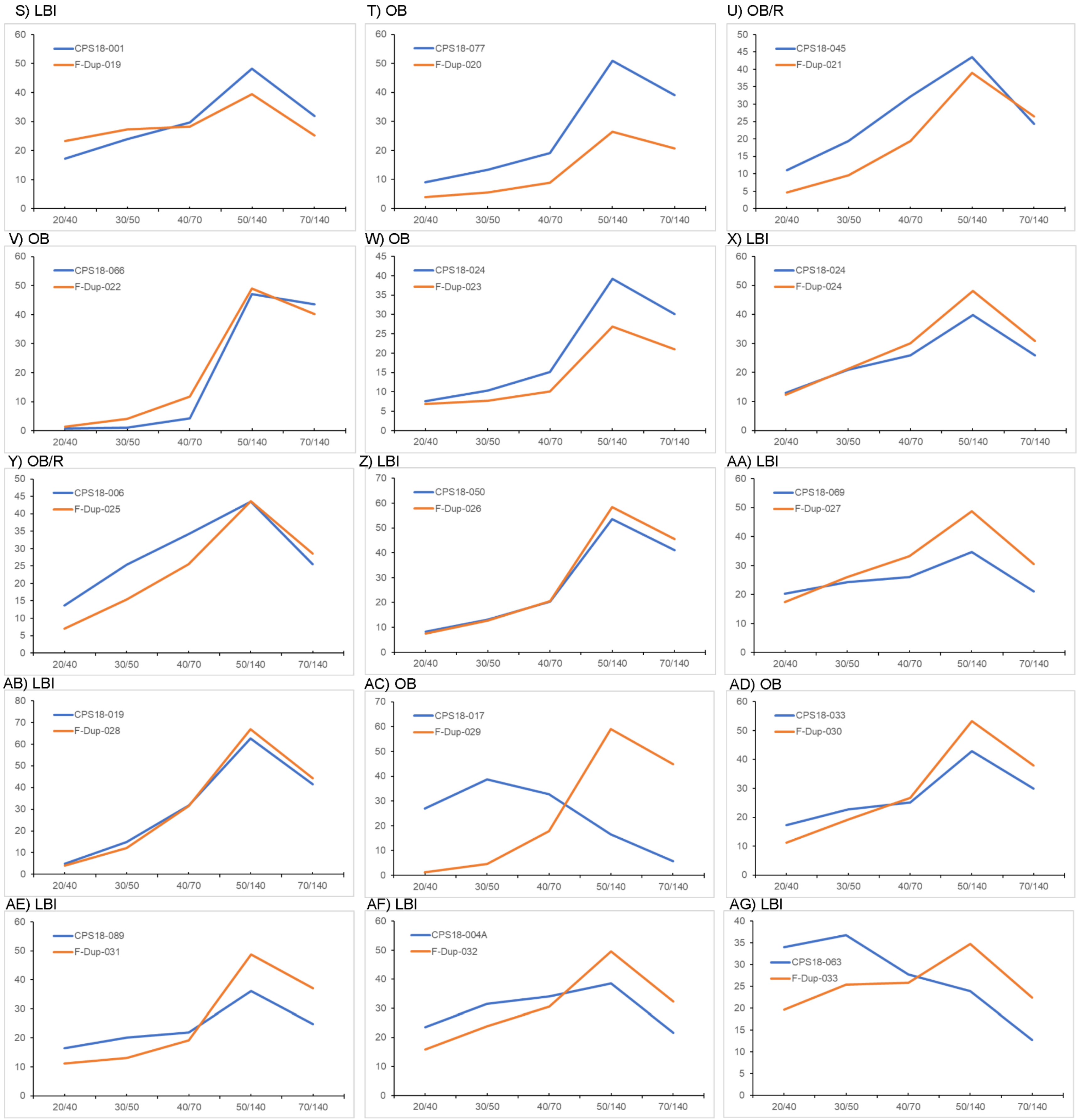


Figure 11.3 Comparison of original gradation analyses versus field duplicate gradation analyses. Presented as mesh sizes.

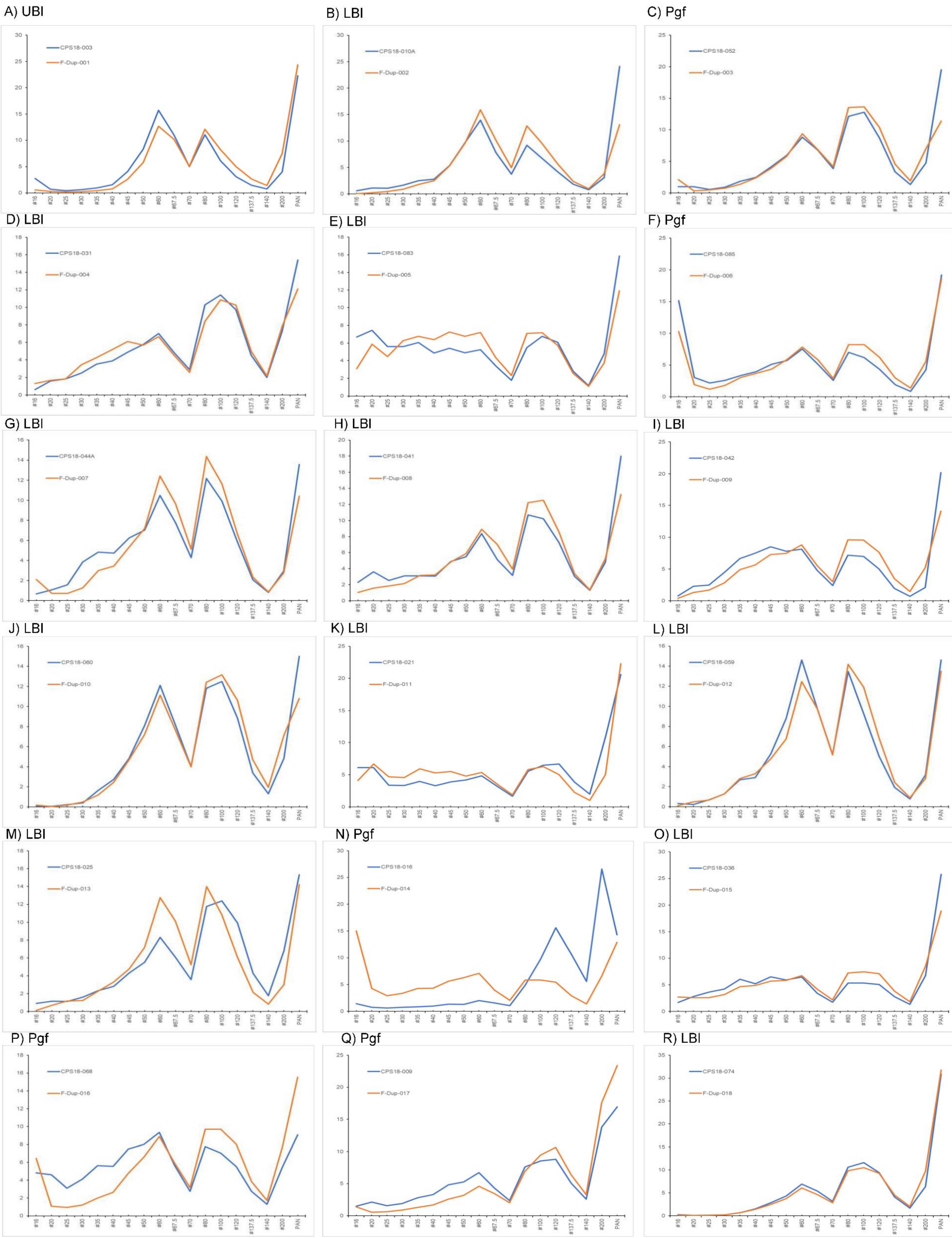
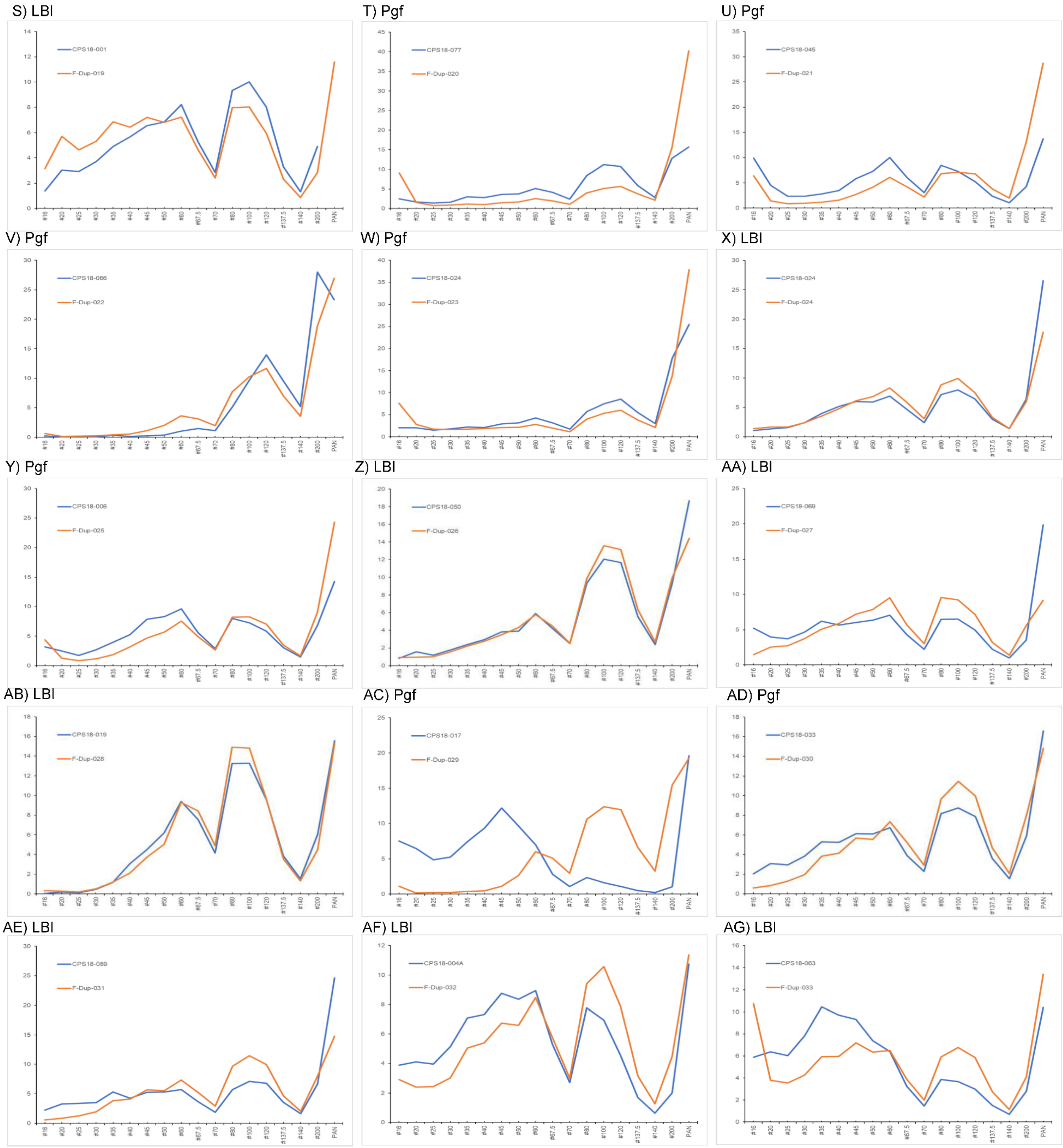


Figure 11.3, Continued.



11.5.2 Multi-Lab Crush Strength QA-QC

A crush resistance laboratory check (n=12 samples) compared pre-washed 40/70 and 50/140 crush test fractions that were prepared at TPS – with a sample fraction split then crushed again at Stim-Lab.

The results are presented in Table 11.4. Unfortunately, the 40/70 and 50/140 pre-prepared sample fractions had a limited amount of material such that incrementally higher crush tests at Stim-Lab was not possible. However, the results do show that there is general agreement in the crush test values. In fact, several crush test measurements are incredibly close. For example,

- Sample CPS18-002 (40/70) had TPS and Stim-Lab 6,000 psi crush results of 18.3% and 18.1%, respectively.

- Sample CPS18-010A (40/70) had TPS and Stim-Lab 6,000 psi crush results of 7.0% and 7.4%, respectively.

These results show that the inter-lab crush test results are similar and hence there is no apparent concern with the crush test data generated by either lab.

Table 11.4. Comparison of crush resistance test work that was conducted on 40/70 and 50/140 fractions that were pre-washed, sieved and split at Turnkey Processing Solutions LLC.

				Crush resistance (to 10% psi) [1]							
Sample ID	Fraction	Geo-unit	Lab	4000 (psi)	5000 (psi)	6000 (psi)	7000 (psi)	8000 (psi)	9000 (psi)	10000 (psi)	11000 (psi)
CPS18-002	40/70	Pfg	TPS	<------	11.0	18.3					
			Stim-Lab	<------	<------	18.1					
CPS18-010A	40/70	LBI	TPS			7.0	------>	------>			
			Stim-Lab			7.4	------>	------>			
CPS18-013	40/70	LBI	TPS			6.3	------>				
			Stim-Lab				<------	14.3			
CPS18-044	40/70	Pfg	TPS	<------	<------	13.5					
			Stim-Lab	<------	<------	19.0					
CPS18-045	40/70	Pfg	TPS	<------	14.3						
			Stim-Lab	<------	16.1						
CPS18-050	40/70	LBI	TPS			<------	11.3				
			Stim-Lab			<------	12.4				
CPS18-062	40/70	LBI	TPS			6.3	------>				
			Stim-Lab			9.9	----->				
CPS18-001	100-mesh	Pfg	TPS			<------	11.3				
			Stim-Lab			<------	13.1				
CPS18-004A	100-mesh	LBI	TPS						9.0	------>	
			Stim-Lab						7.0	----->	----->
CPS18-005	100-mesh	LBI	TPS						9.0	------>	
			Stim-Lab					6.6	----->	----->	
CPS18-012	100-mesh	UBI	TPS						9.8		
			Stim-Lab						7.8	----->	
CPS18-042	100-mesh	LBI	TPS					7.8	------>	------>	
			Stim-Lab					8.0	----->	----->	

[1] psi is pounds per square inch

Highest stress level in which the proppant generates no more than 10% crushed material.

11.5.3 Independent Laboratory Check

In addition to the ‘multi-lab crush strength QA-QC’, the authors selected an identical set of bulk sample material for independent proppant characterization work at Stim-Lab. That is, the bulk sample material was collected on January 22, 2019 by R. Hough and was completed independent of the work conducted at TPS. Stim-Lab was then instructed to conduct proppant characterization test work on the exact same 40/70 and 50/140 splits as the material analyzed at TPS.

The details of the proppant test work are presented in Section 13, Mineral Processing and Metallurgical Testing, but a comparison of the compatible analysis conducted by TPS and Stim-Lab is discussed as part of QA-QC work. The results are presented in Table 11.5 and show good to excellent correlation. Despite TPS having fewer crush tests per sample because of sample amounts, the crush tests performed at TPS and Stim-Lab still correlate. Overall, this QA-QC test gives a high degree of confidence in the crush test work conducted by the authors.

Table 11.5 Comparison of TPS and Stim-Lab crush resistance test work that was conducted on 40/70 and 50/140 fractions with both labs using original bulk sample material.

			Crush resistance (to 10% psi) [2]								
Sample ID [1]	Fraction	Geo-unit	4000 (psi)	5000 (psi)	6000 (psi)	7000 (psi)	8000 (psi)	9000 (psi)	10000 (psi)	11000 (psi)	12000 (psi)
CPS18-002	40/70	Pfg	<------	11.0	18.3						
L-Dup-002			<------	10.6	14.5						
CPS18-010A	40/70	LBI			7.0	------>					
L-Dup-005				4.5		8.4	12.3				
CPS18-013	40/70	LBI			6.3	------>					
L-Dup-007				3.0			9.7	12.3			
CPS18-044	40/70	Pfg		<------	13.5						
L-Dup-010				8.1	12.8						
CPS18-045	40/70	Pfg	<------	14.3							
L-Dup-011			7.7	12.3							
CPS18-050	40/70	LBI			<------	11.3					
L-Dup-012				3.9		8.9	12.3				
CPS18-062	40/70	LBI			6.3	------>					
L-Dup-013				3.5	5.8	Ran out of material					
CPS18-001	100-mesh	Pfg			<------	11.3					
L-Dup-001				5.1	7.7	11.1					
CPS18-004A	100-mesh	LBI						9.0	------>		
L-Dup-003				1.6						9.3	13.5
CPS18-005	100-mesh	LBI						9.0	------>		
L-Dup-004				1.6					9.8	12.3	
CPS18-012	100-mesh	UBI						9.8			
L-Dup-006				1.9				8.8	10.2		
CPS18-031	100-mesh	LBI				<------	<------	16.3			
L-Dup-008				4.9		9.9	11.0				
CPS18-042	100-mesh	LBI					7.8	------>	------>		
L-Dup-009				2.5				9.9	12.5		

[1] 'CPS' samples analyzed at Turnkey Processing Solutions; 'L-Dup' samples analyzed at Stim-Lab.
[2] psi is pounds per square inch
(grey box) Highest stress level in which the proppant generates no more than 10% crushed material.

11.6 Adequacy of Sample Collection, Preparation, Security and Analytical Procedures

The sample collection, preparation and security were conducted by APEX acting as an independent geological consulting company. APEX geologists oversaw all aspects of the sampling program. Ms. Hough P. Geo. was onsite for the drill program and ensured that sampling and chain of custody consistency and protocols were maintained during the entire 2018 Wanipigow Sand Project drill program. The senior author has reviewed the adequacy of the sample collection, preparation and security and found no significant issues or inconsistencies that would cause one to question the validity of the data.

The laboratories that carried out the test work are independent laboratories. The analytical methods carried out by the laboratory is standard and routine in the field of silica sand and proppant characterization test work and are pursuant to International Standard ISO 13503-2. The author has conducted duplicate sample experiments to test the authenticity of the Camsizer in comparison to the 'traditional' sieve stack methodology and found the Camsizer produces a reliable gradation result that is acceptable for resource modelling and estimations. The senior author has reviewed the adequacy of the analytical procedures and found no significant issues or inconsistencies that would cause one to question the validity of the data.

The QA-QC tests conducted on the gradation data and crush tests enable the authors to have a high level of confidence in the laboratories, and precision and accuracy of the gradation data and crush resistance of sand from the Wanipigow Sand Project. In turn, the QA-QC provides confidence of the 'assay' dataset used in the resource estimation presented in this Technical Report and the quality of the Winnipeg Formation silica sand.

12 Data Verification

12.1 Data Verification Procedures

CPS's 2018 drill program was managed by an independent geological consulting company (APEX). Co-author Ms. Hough P. Geo. was onsite for the entirety of the 2018 drill program and can confirm through drill core logging and sampling duties that:

- Material change in the form of a 93-hole drill program occurred on the Property.
- All drilling and associated activities were conducted using industry standard practices.
- All data pertaining to the 2018 drill program, including drilling notes, geotechnical work, photographs, drill logs, samples and chain of custody notes, were entered electronically by independent APEX geologists. Hard copy notes (when present) were transferred to electronic form by independent APEX geologists.

- All data pertaining to the 2018 drill program were verified and validated by independent APEX geologists.

- Any data errors pertaining to the 2018 drill program were corrected into a master dataset managed by Ms. Hough.

Analytical laboratory data was reviewed and validated by independent APEX geologists. Any inconsistencies between the drill logs and analytical data were flagged and reviewed. The senior author was able to discuss the analytical protocols and analytical work with the laboratory managers (for both TPS and Stim-Lab), and no issues in the data analyses were noted.

12.2 Validation Limitations

A limitation of the drill program resulted from localized difficulties in drilling through Pleistocene glaciofluvial and complete, or continuous, acquisition of Winnipeg Formation sample material. To remedy this, on-site APEX geologists re-drilled logistically challenged drillholes to obtain a complete Winnipeg Formation sample. In these instances, the drill was collared directly adjacent to the original drillhole and re-drilled. This approach was successful, and overall, the drill program sampling achieved a 94% core recovery rate.

12.3 Adequacy of the Data

To conclude, all geotechnical and geochemical data associated with the 2018 Wanipigow Sand Project has been properly collected, recorded and reviewed by independent APEX geologists. It is the opinion of the authors that all activities relating to the 2018 drill program on the Wanipigow Sand Project were conducted using proper procedures and industry standard practices. Furthermore, the senior author of this Technical Report has found no significant issues or inconsistencies that would cause one to question the validity of the data. The data were generated with proper procedures, has been accurately transcribed form the original source and is suitable for use in this Technical Report.

It is the opinion of the senior author that the core recovery limitation was largely resolved by the project team. This is a positive attribute of the 2018 drill program as previous exploration drilling attempts were often plagued by poor core recovery. With respect to analytical work, 761 samples were processed for grain size particle distributions. The overall influence of the non-core-recoverable samples (only 6%; see text above) was minimal on the resulting gradation dataset. None of the lost core occurred at significant lithological contacts and the drill density was enough that limitations to the development of the three-dimensional geological model and resource estimation lodes (wireframes) were insignificant and in no way influence the resource estimation process.

Mr. Eccles, P. Geol. is satisfied to include all data generated into the resource modelling, evaluation and estimations as part of the Wanipigow Sand Project silica sand resource estimate presented in this Updated 2020 Preliminary Feasibility Study.

The findings and conclusions presented in Sections 15-19 and 21-22 represent the independent opinions of the authors based on the QP's review of available source data as provided by CPS. This data included forward looking market projections, volume and pricing information, capital, operating, logistical cost estimates, and other relevant information. To verify the information received, BOYD reviewed the information for reasonableness supplemented with the QP's general knowledge of the industrial sand industry (including mining and economic data of other existing silica sand projects), field observations, and our professional judgement. In the QP's opinion, the data were prepared in a manner consistent with reasonable engineering and financial practices and accepted industry standards, and therefore, are adequate for the purpose used in this Updated 2020 Preliminary Feasibility Study.

13 Mineral Processing and Metallurgical Testing

13.1 Recommended Proppant Standards

International Standards ISO 13503-2:2006/Amd.1:2009E provides the specifications for the measurement of properties of proppants used in hydraulic fracturing operations. Major factors that determine the price for proppant include its: 1) strength; 2) sphericity; 3) grain size and uniformity; and 4) overall purity (Benson and Wilson, 2015). More specially, ISO 13503-2:2006/Amd.1:2009E states:

- Sphericity and roundness for proppant is 0.6 or greater, and the recommended sphericity and roundness for high-strength proppant is 0.7 or greater

- Acid soluble material in proppants shall not exceed 2.0 and 3.0 for proppant larger than or equal to the 30/50 and smaller than 30/50 mesh fractions, respectively

- Turbidity of all fracturing proppants shall not exceed 250 nephelometric turbidity units (NTU)

- Crush strength is the highest stress level at which proppant generates no more than 10% crushed material, rounded down to the nearest 1,000 psi, and represents the maximum stress that the material can withstand without exceeding 10% crush (International Standards, 2009). ISO 13503-2 does not include a standard for crush resistance. Rather, consumers may compare stress levels against another marketable proppant. For example, Brown (2012) cited Wisconsin Cambrian sandstone 20/40, 30/50 and 40/70 crush resistance values of 6k, 7k and 10k, respectively.

The published specifications and standards for industrial minerals should be used primarily as a screening mechanism to establish the marketability of an industrial mineral. The suitability of an industrial mineral for use in specific applications can only be determined through detailed market investigations and discussions with potential consumers.

13.2 Wanipigow Property Proppant Test Work: 2009 to 2014

Two separate companies (Gossan Resources Limited, 2009; and Claim Post Resources Inc., 2014) conducted proppant characterization ISO 13503-2 test work at PropTester Inc. in Cypress, TX. A total of 8 size fractions were tested including: 30/50 (n=1), 40/70 (n=3), 50/140 (n=1) and 70/140 (n=3).

The results of the test work are presented in Table 13.1. All fractions met or exceeded ISO 13503-2 recommendations for: 1) Krumbein shape factor for roundness and sphericity (≥0.6 and up to 0.8); 2) acid solubility (70/140 fractions are ≤2.90 and all remaining fractions are ≤1.70); and 3) turbidity (≤25.0).

Notable crush resistance analyses included:

- One 30/50 fraction at 8K;
- Three 40/70 fractions at 7K and 9K (x2);
- One 50/140 fraction at 10K; and
- Three 70/140 fractions at 8K, 9K and 11K.

The authors of this Technical Report note that the sampling detail of the previous company test work is not known, and therefore, the authors and the Issuer do not perceive this work to be currently diagnostic of the Black Island Member sandstone quality. Rather, the data are provided as background information for the reader and a more comprehensive measurement of proppant quality is presented as part of CPS's 2018 exploration program in the text that follows.

13.3 CPS 2018 Proppant Quality Test Work: Turnkey Processing Solutions LLC

Turnkey Process Solutions LLC conducted 665 Krumbein shape factor (roundness and sphericity) and crush test analyses (Table 13.2). The analytical work was conducted on LBI, BS, UBI and Pgf lithological units together with a variety of composite samples that combined numerous lithologies. Most of the analytical work was conducted on the LBI unit followed closely by Pgf, then the multi-lithology composite samples, and the fewest number of analyses were conducted on UBI and BS.

The Krumbein shape factor and crush data are presented in: Table 13.3 (Upper Black Island); Table 13.4 (Lower Black Island); Table 13.5 (Pleistocene glaciofluvial) and Table 13.6 (composite samples that include multiple lithologies). These data are summarized in Table 13.6 and described in the text that follows. The crush resistance tests show the maximum stress level that the material can withstand without exceeding 10% crush.

Table 13.1 Summary of historical proppant characterization test work conducted by Gossan Resources Limited (2009) and Claim Post Resources (2014) at PropTester Inc.

A) Proppant test work conducted by Gossan Resources Limited (2009)

									Crush resistance (to 10% psi) [1]											
Sample ID	Laboratory	Grain size fraction	Date reported by lab	Bulk density (g/cm^3)	Krumbein shape factor (roundness)	Krumbein shape factor (sphericity)	Mean partical diameter (mm)	Median partical diameter (mm)	4000 (psi)	5000 (psi)	6000 (psi)	7000 (psi)	8000 (psi)	9000 (psi)	10000 (psi)	11000 (psi)	12000 (psi)	13000 (psi)	Acid solubility (12:3 HCl:HF)	Turbidity Test (NTU) [2]
155719A	PropTester	30/50	30-Nov-09	1.56	0.77	0.82	/	0.48	2.90	/	/	/	9.50	10.50	/	/	/	/	1.30	5.00
155720A	PropTester	40/70	30-Nov-09	1.51	0.60	0.70	/	0.29	/	5.40	/	/	/	9.80	10.40	/	/	/	1.20	4.00
155721A	PropTester	40/70	30-Nov-09	1.51	0.60	0.70	/	0.29	/	5.50	/	/	/	9.80	10.40	/	/	/	0.60	4.00
155722A	PropTester	70/140	28-Dec-09	1.41	0.70	0.70	/	0.14	/	2.80	/	/	/	8.60	10.70	/	/	/	2.90	21.00
155723	PropTester	70/140	28-Dec-09	1.41	0.70	0.80	/	0.14	/	4.20	/	/	9.00	10.50	/	/	/	/	2.30	13.00

B) Proppant test work conducted by Claimpost Resources (2014)

									Crush resistance (to 10% psi) [1]											
Sample ID	Laboratory	Grain size fraction	Date reported by lab	Bulk density (g/cm^3)	Krumbein shape factor (roundness)	Krumbein shape factor (sphericity)	Mean partical diameter (mm)	Median partical diameter (mm)	4000 (psi)	5000 (psi)	6000 (psi)	7000 (psi)	8000 (psi)	9000 (psi)	10000 (psi)	11000 (psi)	12000 (psi)	13000 (psi)	Acid solubility (12:3 HCl:HF)	Turbidity Test (NTU) [2]
40/70 Sand	PropTester	40/70	13-Jun-14	1.50	0.70	0.70	0.29	0.29	/	/	/	8.70	10.80	/	/	/	/	/	1.70	10.00
50/140 Sand	PropTester	50/140	22-Aug-14	1.46	0.80	0.80	0.20	0.20	/	/	/	/	/	/	9.00	10.60	/	/	1.70	25.00
70/140 Sand	PropTester	70/140	22-Aug-14	1.41	0.80	0.70	0.16	0.16	/	/	/	/	/	/	/	9.30	10.30	/	1.60	18.00

[1] psi is pounds per square inch

[2] NTU = nephelometric turbidity unit; FTU = formazine turbidity unit

(grey shading) Highest stress level in which the proppant generates no more than 10% crushed material, rounded to the nearest 1,000 psi (or K-value)

International standards for proppant specification (ISO 13503-2; 2009-11-01):

- Average sphericity of 0.6 or greater
- Average roundness of 0.6 or greater
- Maximum acid solubility of grains <30/50 is 3.0% and for grains ≥30/50 is 2.0%
- Turbidity shall not exceed 250 NTU (FTU)

Table 13.2 Summary of Krumbein shape factor and crush resistance tests completed by Turnkey Processing Solution LLC, by Wanipigow Sand Project lithology.

Lithological unit	Round-ness	Spher-icity	Crush test results (K value) 20/40	30/50	40\70	70/140	Sub-total
Pleistocene glaciofluvial	43	43	1	1	50	71	209
Upper Black Island	1	1	0	0	8	8	18
Black Shale	/	/	/	/	1	1	2
Lower Black Island	23	23	8	14	94	101	263
Multi-lithology composite	27	27	10	13	48	48	173
						Total	665

Table 13.3 Krumbein shape factor and crush test analyses completed by Turnkey Processing Solutions LLC on Upper Black Island sandstone collected during CPS's 2018 drill program. Grey highlighted records – size fraction attenuated for 8 minutes at 80% solids.

Drillhole ID	Depth (m) [1]	Lithology [2]	Round-ness	Spher-icity	Crush test results (K value) 20/40	30/50	40/70	70/140
CPS18-01	6.00-12.00m	UBI	/	/	/	/	6	9
CPS18-12	1.50-3.00m	UBI	/	/	/	/	7	9
CPS18-12	3.00-4.50m	UBI	/	/	/	/	7	9
CPS18-12	4.50-7.50m	UBI	/	/	/	/	6	8
CPS18-13	1.80-4.50m	UBI	/	/	/	/	8	5
CPS18-74	0.00-4.50m	UBI	/	/	/	/	5	7
CPS18-74	4.50-8.50m	UBI	0.6	0.7	/	/	5	7
CPS18-79	2.80-9.00m	UBI	/	/	/	/	6	8
		Total count	1	1	0	0	8	8
		Minimum	1	1	0	0	5	5
		Maximum	1	1	0	0	8	9
		Average	0.6	0.7	0.0	0.0	6.3	7.8

[1] Sample thicknesses include single sample and multi-sample composites.
[2] Abbrviations: UBI - Upper Black Island.

Table 13.4 Krumbein shape factor and crush test analyses completed by Turnkey Processing Solutions LLC on Lower Black Island sandstone collected during CPS's 2018 drill program. Grey highlighted records – size fraction attenuated 8 minutes at 80% solids.

					Crush test results (K value)				
Drillhole ID	Depth (m) [1]	Lithology [2]	Round-ness	Spher-icity	20/40	30/50	40\70	70/140	Notes
CPS18-03	9.00-12.00m	LBI	/	/	/	/	6	9	
CPS18-03	12.00-19.50m	LBI	/	/	/	/	6	9	
CPS18-03	9.00-19.50m	LBI	0.6	0.7			6	9	
CPS18-04A	12.00-21.00m	LBI	/	/	/	/	6	9	
CPS18-05	12.60-13.50m	LBI	/	/	/	/	6	8	
CPS18-05	12.60-18.10m	LBI	0.5	0.7	/	/	6	8	100-mesh failed 9k 10.5%
CPS18-05	13.50-15.50m	LBI	/	/	/	/	6	8	
CPS18-05	15.50-17.00m	LBI	/	/	/	/	6	8	
CPS18-05	17.00-18.10m	LBI	/	/	/	/	6	8	
CPS18-10A	10.50-13.50m	LBI	/	/	/	/	6	9	
CPS18-10A	10.50-24.00m	LBI	0.6	0.7	/	/	6	8	
CPS18-12	10.50-13.50m	LBI	/	/	/	/	7	8	
CPS18-12	13.50-18.00m	LBI	/	/	/	/	6	8	
CPS18-13	12.00-16.50m	LBI	/	/	/	/	6	8	
CPS18-13	16.50-19.50m	LBI	/	/	/	/	6	8	
CPS18-13	19.50-22.00m	LBI	/	/	/	/	6	8	
CPS18-13	7.50-12.00m	LBI	/	/	/	/	6	8	
CPS18-18	8.60-21.00m	LBI	0.6	0.8	/	6	6	8	
CPS18-18	9.00-16.85	LBI	/	/	/	/	6	9	40/70 passed 6K 9.8% and 100-mesh passed 9K 9.8%
CPS18-20A	8.80-19.60m	LBI	/	/		6	6	8	20/40 failed 5K 13%
CPS18-21	15.00-19.50m	LBI	/	/	/	/	6	8	
CPS18-22	6.00-18.30m	LBI	/	/	4	6	6	8	
CPS18-24	7.50-18.95m	LBI	0.5	0.7	5	6	6	8	100-mesh marginally failed 9K at 10.0%
CPS18-25	4.40-13.50m	LBI	/	/	/	/	6	8	
CPS18-25	4.40-13.50m	LBI	/	/	/	6	6	7	20/40 failed 5K 15.5%; 100-mesh marginally failed 8K 10.3%
CPS18-31	11.20-15.00m	LBI	/	/	/	/	7	9	
CPS18-31	11.20-15.00m	LBI	/	/	/	/	6	/	
CPS18-31	15.00-17.50m	LBI	/	/	/	/	6	9	
CPS18-31	15.00-17.50m	LBI	/	/	/	/	7	/	
CPS18-31	15.00-17.50m	LBI	/	/	/	/	6	7	
CPS18-31	3.00-6.00m	LBI	/	/	/	/	6	9	
CPS18-31	3.00-15.00m	LBI	0.5	0.7	/	/	6	8	3-6 m: 6k/8K; 6-9 m: 7K/9K; 9-11.2 m: 6K/9K; 11.2-15 m: 7K/9K
CPS18-31	6.00-9.00m	LBI	/	/	/	/	7	9	
CPS18-31	6.00-9.00m	LBI	/	/	/	/	6	8	
CPS18-31	9.00-11.20m	LBI	/	/	/	/	6	9	
CPS18-31	9.00-11.20m	LBI	/	/	/	/	7	8	
CPS18-33	10.50-12.00m	LBI	/	/	/	/	6	8	
CPS18-33	10.50-12.00m	LBI	/	/	/	/	/	9	
CPS18-33	12.00-13.50m	LBI	/	/	/	/	6	9	
CPS18-33	13.50-15.10m	LBI	/	/	/	/	6	8	
CPS18-33	13.50-15.10m	LBI	/	/	/	/	6	7	
CPS18-33	13.5-15.15m	LBI	/	/	/	/	6	7	
CPS18-33	9.00-10.50m	LBI	/	/	/	/	6	8	
CPS18-33	9.00-10.50m	LBI	/	/	/	/	/	9	
CPS18-33	9.00-13.50m	LBI	0.5	0.7	/	/	6	8	
CPS18-34	12.00-15.00m	LBI	/	/	/	/	6	8	
CPS18-34	12.00-15.00m	LBI	/	/	/	/	/	9	
CPS18-34	12.00-16.50m	LBI	0.5	0.7	/	/	6	8	
CPS18-34	15.00-16.50m	LBI	/	/	/	/	6	8	
CPS18-36	6.00-15.00m	LBI	0.6	0.8	4	6	6	8	
CPS18-38	10.50-15.00m	LBI	/	/	/	/	6	9	
CPS18-38	9.00-10.50m	LBI	/	/	/	/	6	9	
CPS18-38	9.00-15.00m	LBI	0.6	0.7	/	6	6	9	
CPS18-42	4.50-18.10m	LBI	0.5	0.7	5	6	7	8	4.50-10.5m: 100-mesh passed 9K at 10%
CPS18-42	10.50-13.50m	LBI	/	/	/	/	6	8	
CPS18-42	13.50-18.10m	LBI	/	/	/	/	6	8	
CPS18-42	7.50-10.50m	LBI	/	/	/	/	6	8	
CPS18-44A	9.00-18.60m	LBI	/	/	5	6	7	8	
CPS18-46	13.00-15.00m	LBI	/	/	/	/	6	8	
CPS18-46	13.00-15.00m	LBI	0.5	0.7	/	/	/	8	40/70 @4k failed 10.5%
CPS18-50	9.00-13.50m	LBI	/	/	/	/	7	9	
CPS18-50	9.00-13.50m	LBI	0.5	0.7	/	/	6	8	
CPS18-59	7.50-18.00m	LBI	/	/	/	6	6	8	
CPS18-59	7.50-18.00m	LBI	/	/	/	/	6	8	
CPS18-60	10.50-15.00m	LBI	/	/	/	/	6	8	
CPS18-60	15.00-19.50m	LBI	/	/	/	/	6	8	
CPS18-60	6.00-10.50m	LBI	0.6	0.7	/	/	6	8	
CPS18-60	6.00-19.50m	LBI	/	/	5	6	6	8	
CPS18-61	5.40-7.50m	LBI	/	/	/	/	6	8	
CPS18-61	5.40-7.50m	LBI	/	/	/	/	/	9	
CPS18-61	5.40-9.00m	LBI	0.6	0.7	/	/	6	8	
CPS18-61	7.50-9.00m	LBI	/	/	/	/	/	9	
CPS18-61	9.00-10.20m	LBI	/	/	/	/	6	8	
CPS18-61	9.00-10.20m	LBI	/	/	/	/	5	7	40/70 6K 11.8%; 100-mesh 8K 10.8%; Outer LBI fringe (quality decreases).
CPS18-62	10.30-13.50m	LBI	/	/	/	/	6	8	
CPS18-62	10.30-17.10m	LBI	0.6	0.7	/	/	6	8	
CPS18-62	13.50-17.10m	LBI	/	/	/	/	6	8	
CPS18-63	12.00-13.50m	LBI	/	/	/	/	6	8	
CPS18-63	9.00-12.00m	LBI	/	/	/	/	5	8	
CPS18-63	9.00-13.50m	LBI	0.5	0.7	/	/	6	8	
CPS18-69	5.70-7.30m	LBI	0.5	0.7	/	/	6	8	
CPS18-71	9.00-18.00m	LBI	0.5	0.7	5	6	6	8	
CPS18-72	2.15-18.00m	LBI	0.5	0.6	/	/	5	7	Lower LBI interval contains higher modal abunances of clay
CPS18-72	2.15-9.00m	LBI	/	/	/	/	5	7	
CPS18-72	9.00-18.00m	LBI	/	/	/	/	5	7	
CPS18-73	7.50-9.00m	LBI	/	/	/	/	6	7	
CPS18-74	15.00-19.50m	LBI	/	/	/	/	6	8	
CPS18-74	19.50-24.00m	LBI	/	/	/	/	6	8	
CPS18-76	12.00-13.50m	LBI	0.5	0.6	/	/	6	7	Only 1.5 m of sand in this drillhole (overall - a poor LBI sand intersection)
CPS18-78	3.40-6.50m	LBI	/	/	/	/	7	9	
CPS18-78	3.40-6.50m	LBI	0.6	0.7	/	/	6	8	40/70 failed 7K 10.3%; 100-mesh failed 9K 10.5%
CPS18-83	10.45-12.00m	LBI	/	/	/	/	6	8	
CPS18-83	10.45-12.00m	LBI	/	/	/	/	/	9	
CPS18-83	12.00-13.15m	LBI	/	/	/	/	6	8	
CPS18-83	12.00-13.15m	LBI	/	/	/	/	/	9	
CPS18-83	12.00-13.50m	LBI	/	/	/	/	6	8	10.45-14.95 m: 40/70 6K through all three depths.
CPS18-83	13.15-14.00m	LBI	/	/	/	/	6	8	
CPS18-83	13.15-14.00m	LBI	/	/	/	/	/	9	
CPS18-83	110.45-15.00m	LBI	0.5	0.6			6	7	
CPS18-86	15.00-17.20m	LBI	/	/	/	/	6	8	
CPS18-88	15.00-16.35m	LBI	/	/	/	/	6	8	
CPS18-93	9.00-10.50m	LBI	/	/	5	6	7	8	
CPS18-98	11.30-12.00m	LBI	/	/	/	6	7	8	100-mesh marginally failed 9K 10.0%
		Total count	23	23	8	14	94	101	
		Minimum	1	1	4	6	5	7	
		Maximum	1	1	5	6	7	9	
		Average	0.5	0.7	4.8	6.0	6.1	8.1	

1 Sample thicknesses include single sample and multi-sample composites.
2 Abbreviation: LBI - Lower Black Island

Table 13.5 Krumbein shape factor and crush test analyses completed by Turnkey Processing Solutions LLC on Pleistocene glaciofluvial collected during CPS's 2018 drill program. Grey highlighted records – size fraction attenuated 8 minutes at 80% solids.

					Crush test results (K value)				
Drillhole ID	Depth (m) [1]	Lithology [2]	Round-ness	Spher-icity	20/40	30/50	40/70	70/140	Notes
CPS18-01	0.00-6.00m	OB	/	/	/	/	5	7	
CPS18-01	0.00-6.00m	OB	0.6	0.7	/	/	4	6	40/70 5K failed 10.8%; 100-mesh failed 7K 11.3%
CPS18-02	4.50-7.90m	OB	/	/	/	/	6	8	
CPS18-02	4.50-7.90m	OB	0.5	0.7	/	/	5	6	100-mesh failed 7K 11%
CPS18-06	0.00-12.00m	OB	0.5	0.7	/	/	3	5	
CPS18-08	0.00-15.00m	OB	0.5	0.7	/	/	4	5	
CPS18-09	0.00-7.80m	OB	0.5	0.7	/	/	4	6	40/70 failed 5K 10.8%; 100-mesh failed 7K 11.0%
CPS18-09	7.80-17.40m	OB	/	/	/	/	/	5	
CPS18-15	0.00-10.70m	OB	0.4	0.6	/	/	3	5	40/70 failed 4K 10.1%
CPS18-16	0.00-18.00	OB	0.5	0.6	/	/			40/70 failed 5K 15.3%; 100-mesh failed 7K 17.3%
CPS18-17	0.00-15.60m	OB	0.5	0.7	/	/	3	5	40/70 failed 4K 10.3%
CPS18-18	0.00-8.60m	OB	/	/	/	/	5	7	
CPS18-19	0.00-6.00m	OB	/	/	/	/	5	7	
CPS18-21	0.00-15.00m	OB	/	/	/	/	4	7	
CPS18-23	0.00-8.50m	OB	0.5	0.7	/	/	5	7	
CPS18-24	3.00-7.50m	OB	/	/	/	/	4	6	
CPS18-25	0.00-4.40m	OB	0.6	0.7	/	/	5	7	
CPS18-25	0.00-4.40m	OB	0.6	0.7	/	/	4	5	20/40 failed 4K 14.5%; 30/50 failed 5K 12.8%; 40/70 failed 5K 12.5%
CPS18-26	1.50-9.00m	OB	/	/	/	/	4	6	
CPS18-27	9.00-15.00m	OB	/	/	/	/	4	6	
CPS18-27	9.00-15.00m	OB	0.5	0.7	/	/	4	4	20/40 failed 4K 12.3%; 30/50 failed 4K 11%
CPS18-28	1.50-19.70m	OB	0.5	0.7	/	/	/	6	100-mesh failed @ 7K 13%
CPS18-29	0.00-5.10m	OB	0.5	0.7	/	/	/	5	
CPS18-30	0.00-1.50m	OB	0.5	0.7	/	/	/	6	
CPS18-30	3.00-9.30m	OB	/	/	/	/	/	5	
CPS18-32	1.50-9.00m	OB	0.5	0.7	/	/	/	5	100-mesh @ 6K failed 10.5%
CPS18-32	9.00-14.20m	OB	/	/	/	/	5K	5	
CPS18-37	1.50-17.60m	OB	0.5	0.6	/	/	4K	5	
CPS18-39	0.00-6.00m	OB	/	/	/	/	/		50% of material finer than 140
CPS18-40	0.00-6.80m	OB	0.5	0.7	/	/	/	6	100-mesh failed 7K @ 12.5%
CPS18-40	6.80-11.70m	OB	/	/	/	/	4K	5	100-mesh failed 6K @ 10.5%
CPS18-44	4.50-7.50m	OB	/	/	/	/	6	8	
CPS18-44A	3.60-9.00m	OB	/	/	/	/	5	7	
CPS18-44A	3.60-9.00m	OB	0.5	0.7	/	/	3	6	40/70 failed 4K 10.5%
CPS18-45	9.80-10.90m	OB	0.5	0.6	/	/	5	6	
CPS18-45	9.80-10.90m	OB	/	/	/	/	3	6	40/70 failed 4K 11.3%
CPS18-46	5.00-11.30m	OB	/	/	/	/	5	7	
CPS18-47	4.75-14.95m	OB	0.5	0.7	/	/	/	5	
CPS18-48	4.5-10m	OB	0.5	0.7	/	/	/	5	
CPS18-49	6-12.6m	OB	0.5	0.6	/	/	/	6	
CPS18-51	0.00-3.00m	OB	0.5	0.6	/	/	4	6	
CPS18-52	0.00-2.00m	OB	0.5	0.6	/	/	4	6	
CPS18-64	3.00-9.00m	OB	0.5	0.7	/	/	/	5	
CPS18-65	7.50-10.90m	OB	0.5	0.7	/	/	/	6	
CPS18-67	1.50-16.50m	OB	0.5	0.7	/	/	5	6	100-mesh failed 7K at 11%
CPS18-68	0.00-18.00m	OB	0.5	0.7	/	/	4	6	40/70 failed 5K 12%
CPS18-73	5.35-7.50m	OB	0.5	0.7	/	/	5	7	
CPS18-77	1.50-15.00m	OB	/	/	/	/	5	7	
CPS18-77	1.50-15.00m	OB	0.5	0.7	/	/	5	6	100-mesh failed 7K 11%
CPS18-79	0.00-10.50	OB	0.4	0.6	/	/	/	5	
CPS18-81	0.00-12.00	OB	0.5	0.7	/	/	/	5	
CPS18-84	3.00-13.50m	OB	0.5	0.7	/	/	5	7	
CPS18-85	1.70-6.00m	OB	0.5	0.7	/	/	5	7	
CPS18-85	1.70-6.00m	OB	/	/	/	/	5	7	
CPS18-85	6.00-10.00m	OB	/	/	/	/	6	8	
CPS18-86	12.00-15.00m	OB	/	/	/	/	6	8	
CPS18-86	6.00-9.90m	OB	/	/	/	/	6	8	
CPS18-87	0.00-1.80m	OB	/	/	/	/	6	8	
CPS18-87	0.00-13.50	OB	0.5	0.7			/	6	
CPS18-87	10.00-14.00m	OB	/	/	/	/	6	8	
CPS18-87	6.00-10.00m	OB	/	/	/	/	6	8	
CPS18-88	3.20-7.50m	OB	/	/	/	/	5	7	
CPS18-88	3.20-7.50m	OB	0.5	0.6	/	/	5	6	
CPS18-88	7.50-10.50m	OB	/	/	/	/	5	7	
CPS18-88	7.50-10.50m	OB	/	/	/	/	4	7	
CPS18-89	1.25-11.60m	OB	0.6	0.7	4	/	5	7	
CPS18-93	3.00-9.00m	OB	/	/	/	/	5	7	
CPS18-93	3.00-9.00m	OB	0.5	0.7	/	/	6	8	
CPS18-94	1.10-1.70m	OB	0.5	0.6	/	/	/	5	
CPS18-95	1.50-15.00m	OB	/	/	/	/	5	7	
CPS18-95	1.50-15.00m	OB	0.5	0.6	/	4	5	6	20/40 failed 4K 13.8%; 100-mesh failed 7K 12.3%
CPS18-96	3.00-13.50m	OB	0.5	0.7	/	/	/	5	40/70 failed 4K 11.5%
CPS18-97	4.50-10.50m	OB	0.5	0.7	/	/	/	5	
		Total count	43	43	1	1	50	71	
		Minimum	0.4	0.6	4	4	3	4	
		Maximum	0.6	0.7	4	4	6	8	
		Average	0.5	0.7	4.0	4.0	4.7	6.2	

1 Sample thicknesses include both single sample and composite samples.
2 Abbrviations: OB - Overburden.

Table 13.6 Krumbein shape factor and crush test analyses completed by Turnkey Processing Solutions LLC on composite multi-lithology samples collected during CPS's 2018 drill program. Grey highlighted records – size fraction attenuated 8 minutes at 80% solids.

Drillhole ID	Depth (m) [1]	Lithology [2]	Round-ness	Spher-icity	Crush test results (K value)				Notes
					20/40	30/50	40/70	70/140	
CPS18-13	1.50-22.50m	LBI>BS>UBI>OB	0.5	0.7	4	6	6	8	Best intersection of sand from a logging perspective
CPS18-01	6.00-16.85m	UBI>LBI	/	/	/	/	6	9	6-12m: 40/137.5 8.8%; 9-16.85m: 40/67.5 6K 9.8%; 100m 9K 9.8%
CPS18-20A	8.80-19.60m	LBI>BS	/	/	/	/	6	8	
CPS18-41	3.00-18.70m	LBI>BS	0.5	0.7	/	/	6	8	Failed 9K 10.3; 20/40 failed 5K 19.5%; 30/50 failed 6K 17.3%
CPS18-42	4.50-18.10m	LBI>BS	0.5	0.7	5	6	7	8	100-mesh marginally failed 9K 10.0%
CPS18-74	9.00-24.00m	LBI>BS	/	/	/	/	6	8	
CPS18-75	6.00-19.80m	LBI>BS	0.6	0.7	/	6	7	9	20/40 failed 5K 15.8%
CPS18-19	6.00-18.00m	LBI>OB	0.5	0.7	4	6	5	8	
CPS18-88	10.50-15.00m	LBI>OB	/	/	/	/	6	8	
CPS18-88	10.50-16.35m	LBI>OB	/	/	/	/	6	8	
CPS18-20A	8.80-19.60m	LBI>BS	/	/	4	6	6	8	20/40 failed 5K 13.0%
CPS18-41	3.00-18.70m	LBI>BS	/	/	/	/	6	8	
CPS18-42	4.50-7.50m	LBI>BS	/	/	/	/	6	8	
CPS18-74	9.00-15.00m	LBI>BS	/	/	/	/	6	8	
CPS18-75	6.00-19.80m	LBI>BS	0.6	0.7	/	/	7	9	
CPS18-13	1.50-22.00m	LBI>BS>UBI	0.5	0.7	4	6	6	8	
CPS18-83	10.45-15.00m	LBI>PC	0.5	0.6	/	/	6	7	Included some intercalated clay
CPS18-89	11.60-15.00m	LBI>PC	/	/	/	6	6	8	Included a small component of weathered basement
CPS18-01	9.00-16.85m	LBI>UBI	/	/	/	/	6	9	
CPS18-04A	0.00-21.00m	LBI>UBI	0.6	0.7	/	/	6	8	
CPS18-12	1.50-18.00m	LBI>UBI>BS	0.5	0.7	5	6	6	8	100m failed 9K at 10.5%
CPS18-03	0.00-21.00m	LBI>UBI>BS	0.6	0.7	/	/	6	9	
CPS18-04A	0.00-21.00m	LBI>UBI>BS	0.6	0.7	/	/	6	8	100-mesh failed 9K 10.5%
CPS18-04A	0.00-21.00m	LBI>UBI>BS	/	/	/	/	6	9	
CPS18-12	1.50-18.00m	LBI>UBI>BS	0.5	0.7	5	6	6	8	
CPS18-60	3.00-6.00m	BS>OB	0.5	0.7	3	4	5	6	20/40 marginally failed 4K 10.3%; 100-mesh failed 7K 12%
CPS18-59	0.00-7.50m	BS>UBI>OB	/	/	/	/	5	7	
CPS18-59	0.00-7.50m	BS>UBI>OB	0.5	0.7	/	/	4	6	40/70 failed 5K 12.3%; 100-mesh failed 7K 10.8%
CPS18-04A	0.00-12.00m	UBI>(BS=LBI)	/	/	/	/	6	9	
CPS18-01	6.00-16.85m	UBI>LBI	/	/	/	/	6	9	
CPS18-74	0.00-8.50m	UBI>OB>BS	0.5	0.7	/	/	5	7	Silty at UBI-BS contact
CPS18-85	10.00-15.00m	OB<LBI	/	/	/	/	6	8	
CPS18-59	0.00-7.50m	OB>BS>UBI	0.5	0.7	/	/	4	6	40/70 failed 4K 10.3%; 100-mesh failed 7K 10.8
CPS18-60	3.00-6.00m	OB=BS	0.5	0.7	3	4	5	6	20/40 failed 4K 10.3; 100-mesh failed 7K 12%
CPS18-23	0.00-12.00m	OB>(UBI=LBI)	0.5	0.7	/	/	5	6	100-mesh failed 7K averaging 11%
CPS18-23	8.50-12.00m	OB>(UBI=LBI)	/	/	/	/	5	7	
CPS18-21	0.00-19.50	OB>LBI	0.5	0.7	/	4	4	6	40/70 4K; 100-mesh 6K
CPS18-22	2.20-4.60m	OB>UBI>BS	0.6	0.6	/	/	4	7	
CPS18-73	5.35-9.00m	OB>LBI	0.5	0.7	/	/	5	7	
CPS18-85	6.00-15.00m	OB>LBI			/	/	6	8	2 of 6 composited samples was from the LBI
CPS18-86	6.00-17.20m	OB>LBI	0.5	0.7	/	/	5	6	15-17.2 m: 100-mesh passed 8K 8.5%
CPS18-96	3.00-13.50m	OB>PC	/	/	/	/	5	7	
CPS18-20A	0.00-8.80m	OB>UBI	0.5	0.7	/	/	5	7	
CPS18-20A	0.00-8.80m	OB>UBI	0.5	0.7	4	/	5	6	30/50 failed 4K 16.5%; 100-mesh failed 7K 11.3%
CPS18-22	2.20-4.60m	OB>UBI	0.6	0.6	/	/	5	7	
CPS18-22	2.20-4.60m	OB>UBI	/	/	/	/	4	7	
CPS18-98	5.20-11.30m	OB>UBI	0.5	0.7	/	5	5	7	
CPS18-12	7.50-10.50m	BS>UBI	/	/	/	/	6	8	

[1] Sample thicknesses include both single sample and composite samples.

[2] Abbrviations: LBI - Lower Black Island; UIB - Upper Black Island; BS - Black Shale; OB - Overburden. In instances where composite samples include two or more

The results of this work show that the average roundness of the grains (in all litho-units) ranges between 0.4 and 0.6 with rounder grains associated with the LBI and UBI units in comparison to Pleistocene glaciofluvial. In comparison to ISO 13503-2, the TPS-analyzed roundness is slightly below (0.5) or satisfies (0.6) the standard recommendation for proppant roundness.

The average sphericity of all sandstone material analyzed is 0.7, which meets the ISO 13503-2 criteria for high-strength proppant (0.7). Sand grains from the LBI have the highest sphericity with measurements of up to 0.8. Grains smaller than the 30/50 fraction have acid solubility of less than the ISO Standards recommended 3.0 (0.78-1.79) and all grains have significantly lower turbidity than the ISO Standards recommended 250 NTU (4.3-39.1 NTU).

The crush test data for the LBI, UBI and Pgf is summarized in Table 13.7. Observations of these data are presented as follows:

- The LBI unit has an average 20,40, 30/50, 40/70 and 40/70 crush resistance of 5K, 6K, 6K and 8K, respectively.

- Additional UBI analyses are required because the data are currently limited; based on the current data, the UBI has a 40/70 and 70/140 crush resistance of approximately 6K and 8K.

- The Pgf generally yields low average crush resistance in comparison to the Black Island Member sandstone with a 20/40, 30/50, 40/70 and 70/140 crush resistance of 4K, 4K, 5K and 6K.

Overall, the LBI unit has the highest crush resistance average and maximum values for all size fractions. Having said that, and despite a limited number of samples analyzed (relative to LBI), the UBI unit is comparable if not of equal proppant quality to the LBI.

The composite multi-lithology crush resistance analytical results presented in Table 13.6 are complicated to describe because of the number of mixed-lithology combinations, but general observations include:

- A 21 m composite sample that includes all lithologies encountered at the Wanipigow Sand Project (drillhole CPS18-13, 1.50 to 22.50 m) yielded 20/40, 30/50, 40/70 and 70/140 crush resistance values of 4K, 6K, 6K and 8K.

- Generally, any sand composite that is dominated by LBI (n=25 analyses), and/or to a lesser degree UBI (n=3 analyses), has the highest crush resistance values of the multi-lithology samples analyzed for crush strength. The LBI and UBI multi-lithology sample composites had 20/40, 30/50, 40/70 and 70/140 crush resistance values of 4K, 6K, 6K and 8K, respectively. Two of the 3 UBI samples analyzed had a 70/140 crush resistance of 9K.

- In comparison, the crush resistance of any sample composed of Pgf dropped off in comparison to LBI/UBI. Of the 17 Pgf-containing composite samples, the average 20/40, 30/50, 40/70 and 70/140 crush resistances were 3-4K, 4K, 5K and 7K.

- As expected, composite samples containing BS had the lowest crush resistance with 20/40, 30/50, 40/70 and 70/140 crush resistances of 3K, 4K, 5K and 6K.

Table 13.7 Summary of Turnkey Processing Solutions LLC Krumbein shape factor and crush resistance test work completed at the Wanipigow Sand Project.

		Round-ness	Spher-icity	Crush test results (K value)			
				20/40	30/50	40\70	70/140
	Total count	23	23	8	14	94	101
Lower Black Island	Minimum	0.5	0.6	4	6	5	7
	Maximum	0.6	0.8	5	6	7	9
	Average	0.54	0.70	4.8	6.0	6.1	8.1
	Total count	1	1	0	0	8	8
Upper Black Island	Minimum	0.6	0.7	0	0	5	5
	Maximum	0.6	0.7	0	0	8	9
	Average	0.60	0.70	0	0	6.3	7.8
	Total count	43	43	1	1	50	71
Pleistocene glaciofluvial	Minimum	0.4	0.6	4	4	3	4
	Maximum	0.6	0.7	4	4	6	8
	Average	0.50	0.67	4.0	4.0	4.7	6.2

Note: The reader should be aware that some Stim-Lab test lab work yielded higher results (e.g., 40/70 fraction with roundness of 0.7 and 50/140 crush resistance of up to 11K see Table 13.8).

13.4 CPS 2018 Proppant Quality Test Work: Stim-Lab Inc.

A total of 14 original sand samples were sent directly to Stim-Lab by CPS for proppant characterization test work on 40/70 and 50/140 fractions. The results are presented in Table 13.8. Krumbein shape factor results correlate well with the TPS results (average roundness and sphericity of 0.6 and 0.7). The Stim-Lab analyzed 40/70 fractions, however, were described as having a higher degree of roundness (4 of 7 grains at 0.7).

The crush resistance of the 40/70 and 50/140 samples ranges between 4K and 8K, and 6K to 11K, respectively, with average crush comparable to those reported by TPS (i.e., compare Tables 13.8 and 13.7). Like TPS, the Stim-Lab crush tests showed LBI and UBI had crush values of 7K to 8K for 40/70 and 7K to 11K for 50/140; and these were significantly higher than crush test results for Pgf of 4K to 5K for 40/70 and 6K for 50/140.

Table 13.8 Summary of proppant characterization test work conducted by Canadian Premium Sand at Stim-Lab (2018).

										Crush resistance (to 10% psi) [1]											
Sample ID	Laboratory	Grain size fraction	Lithology	Lab report date	Bulk density (g/cm^3)	Krumbein shape factor (roundness)	Krumbein shape factor (sphericity)	Mean partical diameter (mm)	Median partical diameter (mm)	4000 (psi)	5000 (psi)	6000 (psi)	7000 (psi)	8000 (psi)	9000 (psi)	10000 (psi)	11000 (psi)	12000 (psi)	13000 (psi)	Acid solubility (12:3 HCl:HF)	Turbidity Test (NTU) [2]
L-Dup-005	Stim-Lab	40/70	LBI	25-Feb-19	1.48	0.70	0.70	0.212	0.196	/	4.50	/	8.40	12.30	/	/	/	/	/	0.80	12.00
L-Dup-007	Stim-Lab	40/70	LBI	25-Feb-19	1.50	0.70	0.70	0.210	0.190	/	3.00	/	/	9.70	12.30	/	/	/	/	0.80	8.00
L-Dup-012	Stim-Lab	40/70	LBI	25-Feb-19	1.45	0.70	0.70	0.255	0.217	/	3.90	/	8.90	12.30	/	/	/	/	/	1.10	8.00
L-Dup-013	Stim-Lab	40/70	LBI	25-Feb-19	1.47	0.70	0.70	0.350	0.294	/	3.50	5.80	Ran out of material			/	/	/	/	1.00	5.00
L-Dup-002	Stim-Lab	40/70	Pgf	25-Feb-19	1.43	0.60	0.70	0.295	0.225	/	10.60	14.50	/	/	/	/	/	/	/	7.30	7.00
L-Dup-010	Stim-Lab	40/70	Pgf	25-Feb-19	1.42	0.60	0.70	0.278	0.206	/	8.10	12.80	/	/	/	/	/	/	/	9.20	12.00
L-Dup-011	Stim-Lab	40/70	Pgf	25-Feb-19	1.38	0.60	0.70	0.214	0.174	7.70	12.30	/					/	/	/	9.00	9.00
L-Dup-006	Stim-Lab	50/140	UBI	25-Feb-19	1.48	0.60	0.70	0.237	0.208	/	1.90	/	/	/	8.80	10.20	/	/	/	3.70	14.00
L-Dup-003	Stim-Lab	50/140	LBI	25-Feb-19	1.48	0.70	0.70	0.242	0.218	/	1.60	/	/	/	/	/	9.30	13.60	/	0.80	11.00
L-Dup-004	Stim-Lab	50/140	LBI	25-Feb-19	1.46	0.60	0.70	0.228	0.206	/	1.60	/	/	/	/	9.80	12.30	/	/	0.60	9.00
L-Dup-008	Stim-Lab	50/140	LBI	25-Feb-19	1.42	0.60	0.70	0.319	0.247	/	4.90	/	9.90	11.90	/	/	/	/	/	1.60	13.00
L-Dup-009	Stim-Lab	50/140	LBI	25-Feb-19	1.45	0.60	0.70	0.243	0.213	/	2.50	/	/	/	9.90	12.50	/	/	/	1.10	13.00
L-Dup-013	Stim-Lab	50/140	LBI	25-Feb-19	1.44	0.60	0.70	0.205	0.196				5.80	8.50	Ran out of material			/	/	1.50	5.00
L-Dup-001	Stim-Lab	50/140	Pgf	25-Feb-19	1.43	0.60	0.70	0.349	0.254	/	5.10	7.70	11.10	/	/	/	/	/	/	6.50	13.00

[1] psi is pounds per square inch

[2] NTU = nephelometric turbidity unit; FTU = formazine turbidity unit

(shaded) Highest stress level in which the proppant generates no more than 10% crushed material, rounded to the nearest 1,000 psi (or K-value)

International standards for proppant specification (ISO 13503-2; 2009-11-01):

- Average sphericity of 0.6 or greater
- Average roundness of 0.6 or greater
- Maximum acid solubility of grains <30/50 is 3.0% and for grains ≥30/50 is 2.0%
- Turbidity shall not exceed 250 NTU (FTU)

The acid solubility ranges from 0.8 to 9.2; and as such, 3 of 7 40/70 measurements and 2 of 7 70/140 measurements do not meet the ISO 13503-2 criteria for proppant. None of the LBI sand failed (only the Pgf sand). It is possible that the Pgf acid solubility can be improved as part of the processing. Turbidity tests were measured between 5.0 and 14.0 and are therefore well below the ISO 13503-2 recommendation of <250 NTU.

13.5 CPS Proppant Quality Test Work: Lonquist & Co. LLC.

A total of 16 original sand samples were sent directly to Lonquist by CPS for proppant characterization test work on 20/40, 30/50, 40/70, 50/140 and 70/140 fractions. The results are presented in Table 13.9.

Krumbein shape factor roundness results correlate well with the TPS and Stim-Lab results (average roundness of 0.6). The Lonquist analyzed fractions, however, were described as having a higher degree of spherhicity (either 0.7 or 0.8).

The crush resistance results are summarized as follows:

- 20/40 fractions had a crush resistance of 5K (n=1);
- 30/50 fractions had a crush resistance of 7K and 8K (n=2);
- 40/70 fractions had a crush resistance of 7K (n=2) and 8K (n=3);
- 50/140 fractions had a crush resistance of 11K and 12K (n=2);
- 70/140 fractions had a crush resistance of 8K (n=1), 10K (n=2) and 11K (n=1).

13.6 CPS Conductivity and Permeability Test Work: Stim-Lab.

Long-term conductivity is a measure of the hydraulic fracture's ability to allow flow. Long-term permeability is a measure of a porous medium's ability to flow measured in Darcys, or fractions. Proppant slurries are pumped into the induced fracture to keep it open so that the hydrocarbon production from the well can be significantly enhanced. Consequently, the conductivity and permeability of the carried proppant is of importance as it provides the long-term conductivity of the fracture and the pore space for the oil/gas to flow.

Two LBI sample fractions (40/70 fraction of sample CPS-LBI-1002 and 50/140 fraction of sample CPS-LBI-1003) were sent to Stim-Lab for conductivity and permeability analysis. The sand fractions were evaluated at 2 lb/ft^2 at 150º F and long-term for 50 hours at 2000, 4000, 6000, 8000, and 10,000 psi closure stress between Ohio Sandstone.

The long-term conductivity and permeability test results are presented in Table 15 and 16, and Figure 13.1. The results show how the proppant might react to propping open the fracture space over increasingly higher stress.

Table 13.9 Summary of proppant characterization test work conducted by Canadian Premium Sand at Lonquist.

									Crush resistance (to 10% psi) [1]												
Sample ID	**Laboratory**	**Grain size fraction**	**Date reported by lab**	**Bulk density (g/cm^3)**	**Krumbein shape factor (roundness)**	**Krumbein shape factor (sphericity)**	**Mean partical diameter (mm)**	**Median partical diameter (mm)**	**4000 (psi)**	**5000 (psi)**	**6000 (psi)**	**7000 (psi)**	**8000 (psi)**	**9000 (psi)**	**10000 (psi)**	**11000 (psi)**	**12000 (psi)**	**13000 (psi)**	**14000 (psi)**	**Acid solubility (12:3 HCl:HF)**	**Turbidity Test (NTU) [2]**
1909LBI2001	Lonquist	20/40	4-Oct-2019	1.52	0.6	0.8	0.442	0.325	5.94	10.00	14.80	/	/	/	/	/	/	/	/	/	10.9
1909LBI2003	Lonquist	20/40	4-Oct-2019	/	0.7	0.8	0.219	0.191	/	/	/	/	/	/	/	/	/	/	/	/	/
1909LBI2004	Lonquist	20/40	4-Oct-2019	/	0.6	0.8	0.236	0.208	/	/	/	/	/	/	/	/	/	/	/	/	/
1909LBI2006	Lonquist	20/40	4-Oct-2019	1.49	0.6	0.8	0.380	0.272	/	/	/	/	/	/	/	/	/	/	/	/	16.5
1909LBI2002	Lonquist	30/50	4-Oct-2019	1.51	0.6	0.8	0.255	0.219	/	/	5.84	8.41	11.77	/	/	/	/	/	/	/	/
1909LBI2005	Lonquist	30/50	4-Oct-2019	/	0.6	0.8	0.370	0.274	/	/	/	/	/	/	/	/	/	/	/	/	/
1909LBI2001	Lonquist	40/70	4-Oct-2019	1.48	0.5	0.7	0.442	0.325	/	3.30	/	7.30	9.70	13.22	/	/	/	/	/	0.82	4.3
1909LBI2003	Lonquist	40/70	4-Oct-2019	1.48	0.6	0.8	0.219	0.191	/	/	/	6.25	8.77	11.35	/	/	/	/	/	/	10.6
1909LBI2004	Lonquist	40/70	4-Oct-2019	1.49	0.6	0.8	0.236	0.208	/	/	/	5.64	8.48	11.08	/	/	/	/	/	/	5.8
1909LBI2006	Lonquist	40/70	4-Oct-2019	1.45	0.6	0.8	0.380	0.272	/	/	/	10.00	14.13	/	/	/	/	/	/	1.05	6.0
1909LBI2002	Lonquist	50/140	4-Oct-2019	1.46	0.6	0.7	0.255	0.219	/	/	/	/	3.16	/	4.85	/	8.03	10.23	13.50	/	39.1
1909LBI2005	Lonquist	50/140	4-Oct-2019	1.46	0.6	0.8	0.370	0.274	/	/	/	/	/	/	/	8.45	10.36	/	/	/	19.3
1909LBI2001	Lonquist	70/140	4-Oct-2019	1.42	0.6	0.7	0.442	0.325	/	/	/	/	6.03	7.06	9.89	12.81	/	/	/	1.02	13.7
1909LBI2003	Lonquist	70/140	4-Oct-2019	1.45	0.6	0.7	0.219	0.191	/	/	/	/	/	/	7.89	9.53	13.43	/	/	0.94	8.7
1909LBI2004	Lonquist	70/140	4-Oct-2019	1.42	0.6	0.7	0.236	0.208	/	/	/	/	/	/	8.54	11.01	/	/	/	0.78	9.4
1909LBI2006	Lonquist	70/140	4-Oct-2019	1.40	0.6	0.7	0.380	0.272	/	/	/	/	5.66	11.01	/	/	/	/	/	1.79	10.8

[1] psi is pounds per square inch

[2] NTU = nephelometric turbidity unit; FTU = formazine turbidity unit

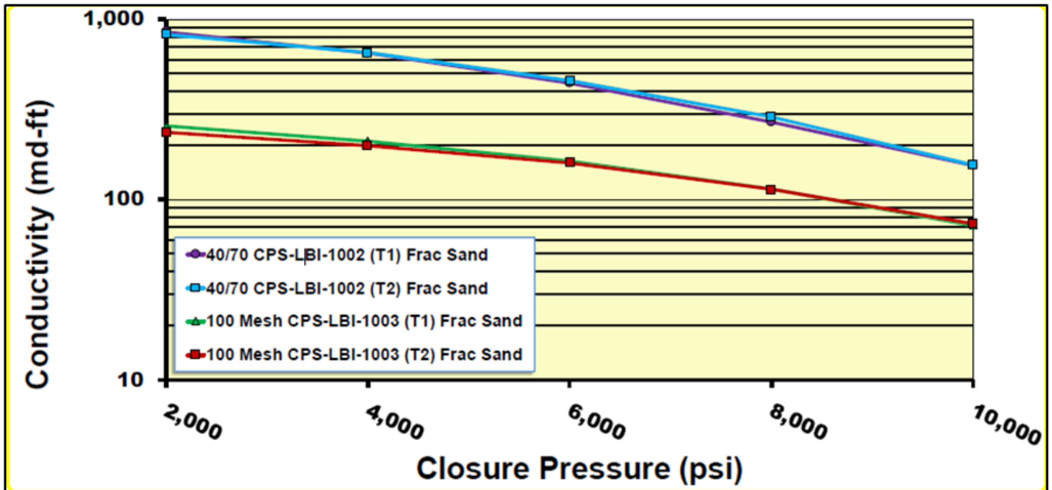
(shaded) Highest stress level in which the proppant generates no more than 10% crushed material, rounded to the nearest 1,000 psi (or K-value)

International standards for proppant specification (ISO 13503-2; 2009-11-01):

- Average sphericity of 0.6 or greater
- Average roundness of 0.6 or greater
- Maximum acid solubility of grains <30/50 is 3.0% and for grains ≥30/50 is 2.0%
- Turbidity shall not exceed 250 NTU (FTU)

Figure 13.1 Conductivity and permeability measurements on 40/70 and 50/100 fraction LBI sand.

A) Long-term conductivity with 2% KCl between Ohio sandstone at 150º F at 2 lb/ft^2.

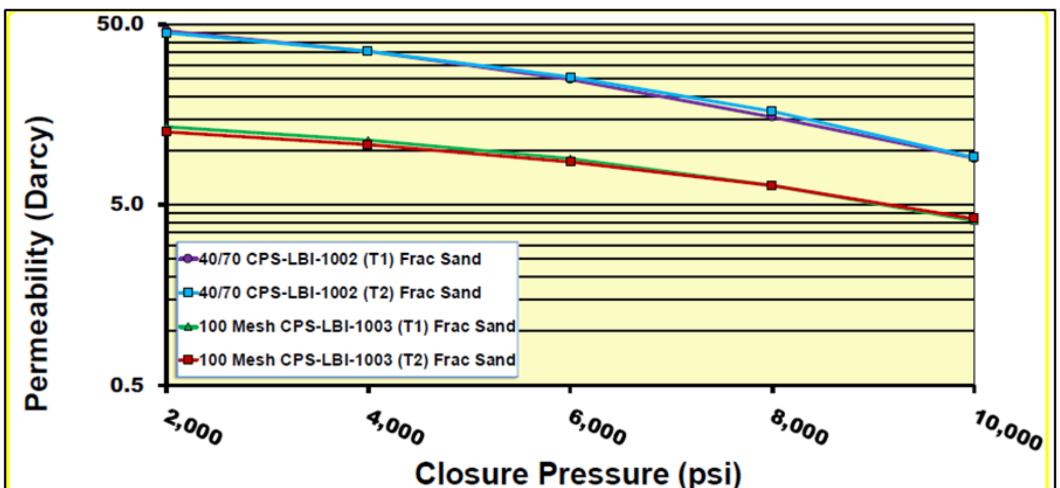


August 19 - 30, 2019

Stress (psi)	2,000	4,000	6,000	8,000	10,000
40/70 CPS LBI-1002 (T1)	854	648	444	270	155
40/70 CPS LBI-1002 (T2)	825	653	459	288	156
100 Mesh CPS LBI-1003 (T1)	256	211	164	114	72
100 Mesh CPS LBI-1003 (T2)	236	199	160	114	74

*Sample Data Represents the 50 Hour Conductivity Value at the Given Closure Stress

B) Long-term permeability with 2% KCl between Ohio sandstone at 150º F at 2 lb/ft^2.



August 19 - 30, 2019

Stress (psi)	2,000	4,000	6,000	8,000	10,000
40/70 CPS LBI-1002 (T1)	46	36	25	15	9.1
40/70 CPS LBI-1002 (T2)	45	36	26	17	9.2
100 Mesh CPS LBI-1003 (T1)	14	11	9.0	6.4	4.1
100 Mesh CPS LBI-1003 (T2)	13	11	8.7	6.4	4.2

*Sample Data Represents the 50 Hour Permeability Value at the Given Closure Stress

For example, between closure pressures of 2,000 and 10,000 psi, the 40/70 sand has high average conductivity (825-854 and 155-156 md-ft at 2,000 and 10,000 psi) and permeability (45-46 and 9.1-9.2 darcy's at 2,000 and 10,000 psi) with losses of 684 md-ft and 36 darcys, respectively over this pressure interval. At the same pressure intervals, the 50/140 fraction has average conductivity (236-256 and 72-74 md-ft at 2,000 and 10,000 psi) and permeability (13-14 and 8.8-9.9 darcy's at 2,000 and 10,000 psi) with losses of 173 md-ft and 9 darcys owing to the low overall conductivity and permeability.

13.7 Lower and Upper Black Island Proppant Characterization Summary

To conclude, it is the opinion of the senior author that CPS has conducted an above normal amount of proppant characterization work, and hence, has increased the confidence level in defining the quality of the proppant at the Wanipigow Property. This is important as the Wanipigow Sand Project, and the proppant characterization studies completed by CPS, represent new information on a relatively new deposit in a new spatial location, and therefore, provides sand quality information that define the sand specifically to the Wanipigow Sand Project.

The proppant test work results show that the Lower and Upper Black Island Member silica sand meets the recommendations set forth in International Standards ISO 13503-2:2006/Amd.1:2009E for sieve size fractions, sphericity, roundness, acid solubility and turbidity and crush classification. This means the Wanipigow Sand Project contains silica sand that meets the measurement specifications for use in hydraulic fracturing operations.

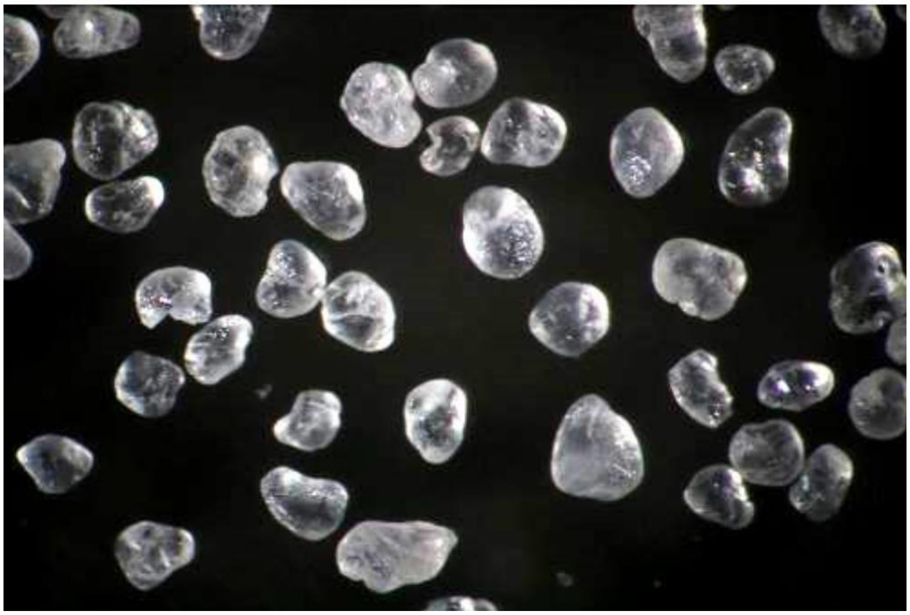
Beyond ISO specifications, other positive attributes of the Wanipigow silica sand include its modal abundance of clear, clean silica grains (Figure 13.2) and LBI/UBI sand with very low turbidity values (<13 Formazin Turbidity Units). This means the sand is less likely to have aggregation issues during sand processing and as such it is possible that the Wanipigow proppant requires less rigor and quality control during the cleaning processes before it is suitable to be sold to customers.

Accordingly, and with respect to reporting a resource estimate that abides by NI 43-101, the CPS proppant test work results show the quality of the Lower and Upper Black Island Member silica sand from the Wanipigow Sand Project has reasonable prospect of economic extraction.

13.8 Pleistocene Glaciofluvial Proppant Characterization Summary

The Pleistocene glaciofluvial sand at the Wanipigow Sand Project – collectively – is of lower quality than the LBI or UBI sand. The Pgf geo-unit has roundness of 0.4 to 0.6, sphericity of 0.6 to 0.7, and crush resistance of 3K to 6K (40/70), 6K (50/140) and 4K to 8K (70/140). The range of proppant test work results might be indicative of sand that is sourced in surficial deposits, which traditionally and on a more global scale, include a mixture of detrital material derived from a variety of sources.

Figure 13.2 Photomicrograph of the 40/70 fraction Wanipigow Lower Black Island sand from drillhole CPS18-10A. Source: Stim-Lab Inc. Note: No scale bar was provided; the 40/70 fraction sieve size spans 0.210 mm to 0.420 mm.



During the drilling program, subsequent core logging and interpretation of the proppant test work results, however, it was observed that the Wanipigow Property includes surficial deposits that are characterized by localized exfoliated and/or reworked Winnipeg Formation bedrock silica sand that is intermixed with glaciofluvial, glaciolacustrine and till. This contention is supported by the proppant test work conducted that shows some Pgf sand fractions yield ISO/API proppant results that are equivalent to the LBI/UBI geo-units (e.g., roundness of 0.6 and crush resistance of up to 6K (40/70) and 8K (70/140).

It is possible, therefore, that the Pgf is not exclusively classified as waste material and that: 1) portions of the Pgf sand have ISO/API test results that assimilate reworked UBI; and/or 2) the Pgf geo-unit could be used for specific fracking applications or upgraded via processing to higher levels of proppant classification. In addition, the Pgf could have potential for other applications such as road building or concrete manufacturing as part of CPS's proposed development process.

13.9 Comparison to Other Silica Sand Deposits

Because the Wanipigow Sand Project represents a 'new' silica sand prospect that has yet to be processed/implemented/tested in the O&G hydraulic fracturing sector, it is too early to compare processed Black Island Member proppant product with the "Tier" classification system being used by industry to market proppant from producing silica sand deposits (e.g., Veatch et al., 2017; Jacob, 2018; Schneyer and Wall, 2018).

Having said this, the Black Island Member sand is more like Tier 1 Northern White sand (e.g., Wisconsin Cambrian sandstone) in comparison to Tier 2 Brown or Hickory sand in that:

1. The Ordovician sand was deposited adjacent to the Precambrian Shield and is therefore devoid of deleterious basinal minerals (e.g., carbonate) that might reduce the durability of the proppant; and

2. The silica sand is pristine in nature with little to no diagenetic cement (loosely kaolinitic cementation) such that the sand is process ready.

The senior author concludes, however, that the pre-processed Black Island Member sand is slightly less geologically super-mature than Northern White sand. Nevertheless, and given the current emphasis on utilizing local, or in-basin, sand sources by oil and gas companies attempting to reduce transportation costs, the Black Island Member sand is considered a viable proppant option by the authors. In time and possibly with reservoir production testing, sand from the Wanipigow Sand Project may be classified, or Tiered, in comparison to producing silica sand deposits.

Note: The authors recognize that the proppant Tier classification system is not a recognized proppant standard or a certified designation of quality. Rather, the Wanipigow Project silica sand meets ISO 13503-2 quality specifications for frac sand product, and this statement best defines the silica sand quality/grade in accordance with the CIM Definition Standards.

14 Mineral Resource Estimates

14.1 Previous Mineral Resource Estimates

In 2014, a 43-101 Technical Report was prepared for CPS (then Claim Post Resources Ltd.) by P&E Mining Consultants (Puritch et al., 2014). In 2019, the authors of this Technical Report prepared new resource estimations together with a Preliminary Feasibility Study Technical Report based on the results of CPS's 2018 exploration work (Eccles et al., 2019).

Since then, the Wanipigow Property's land position has changed (see Section 4.1, Property) and CPS has completed a capital optimization review (Canadian Premium Sand Inc., 2020). Hence the intent of this resource section is to present updated resource estimations based on the new Property boundary and resource area.

The mineral resources presented does not rely on any data, models or information from the Puritch et al. (2014) Technical Report. The updated 2020 Prefeasibility Study Technical Report does rely on data, including the resource model and resource geostatistical parameters that were originally created by the same authors in the previous 2019 Prefeasibility Study (Eccles et al., 2019). The Issuer no longer relies on the 2014 or

2019 mineral resource estimates considering the intent of this NI 43-101 updated 2020 Preliminary Feasibility Study, which supersedes all previous technical reporting work.

14.2 Introduction to the Updated Mineral Resource Estimations

Resource analysis, 3-D geological modeling and resource estimation as part of this Updated 2020 Preliminary Feasibility Study was prepared by Mr. Black, M.Sc. P. Geo. of APEX (under the direct supervision of Mr. Eccles, M.Sc. P. Geol.). Mr. Black estimated the 3-D block model, conducted statistical analysis and calculated the resource estimations. The workflow implemented for the calculation of the Wanipigow Property Silica Sand Resource Estimate was completed using the commercial mine planning software MICROMINE (v 18.0). The Anaconda Python distribution (Continuum Analytics, 2017) and contributions made by Mr. Black to the Python module for geostatistical modeling, pygeostat (CCG, 2016), are used for supplemental data analysis. Mr. Eccles coordinated the 3-D geological model and resource estimation, reviewed all information and takes overall responsibility for the resource estimate presented in this Technical Report.

APEX was commissioned by CPS to oversee the geology aspects of the 2018 drill program at the Wanipigow Property, including collar surveying, geological logging, sample collection (at nominal 1.5 m sample lengths), sample collection for density and proppant characterization test work, chain of custody and laboratory coordination. This work was conducted under the direction of the Mr. Eccles, P. Geol.

A Qualified Person site inspection was completed on March 4-6, 2019, in which the senior author visited select drill sites and participated in an active backhoe trench site. This enabled Mr. Eccles to verify – in the field setting -- the Pgf and UBI geological units. Archived drill samples were reviewed enabling the senior author to verify the BS and LBI units (which were not obtainable using a backhoe). The samples reviewed were duplicates of samples sent for gradation analysis and proppant characterization test work.

The Wanipigow Property Silica Sand Resource Estimate is reported in accordance with NI 43-101 and has been estimated using the CIM “Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines” dated November 29th, 2019 and CIM “Definition Standards for Mineral Resources and Mineral Reserves” amended and adopted May 10th, 2014. Mineral resources are not mineral reserves and do not have demonstrated economic viability.

14.3 Data

14.3.1 Drilling Data Summary and Processing

APEX reviewed all historical data associated with the Wanipigow silica sand deposit, which has been explored and studied since the 1980s (formerly the Seymourville Project). The historical data included a series of vertical drillholes that were drilled within the Wanipigow Property limits, as described in Section 6.2.

In 2018, CPS completed a 93 sonic drillhole program that was logged and sampled by APEX geologists, as described in Section 10. Collected samples were submitted for particle distribution gradation analysis at TPS and Stim-Lab (see Section 11). As described in Section 7.2 and Section 14.2.1, stratigraphic log data from CPS 2018 drill program were used to define the following four geological units of interest (Section 7.2):

- Paleocene glacial fluvial (Pgf) – Ground moraine glaciofluvial, glaciolacustrine and till locally composed of sand intervals that are intercalated with sand and gravel and clay till;
- Upper Black Island (UBI) – An upper Winnipeg Formation subunit characterized by a white to rust-coloured/stained silica sand;
- Black Shale (BS) – Divides the UBI and LBI silica sand subunits and is characterized by a thin layer of black shale that periodically comprises ooidal pyrite; and
- Lower Black Island (LBI) – The basal subunit of the Winnipeg Formation is characterized by grey-white silica sand with minor kaolinite cement.

The particle size/gradation analysis completed during the CPS 2018 drill program were used to estimate the 3D block model as described in Section 14.4. The following text describes the dataset pertinent to the calculation of the Wanipigow Property Silica Sand Resource Estimate.

Grain size particle distribution analyses were conducted throughout intersections with adequate sample recovery from 90 of the 93 vertical sonic holes drilled by CPS in 2018. Samples were taken approximately every 1.5 m, which correlates to the length of the core barrel. A summary of the number of samples collected from each of the formations of interest is detailed in Table 14.1.

Table 14.1 Summary of interval types from the CPS 2018 drill program.

FM	Samples Collected	No Recovery	No Sample (Clay)	No Sample (Gravel)
Pgf	451	22	75	22
UBI	57	0	0	0
BS	17	0	0	0
LBI	236	4	1	0

A total of 744 samples were collected within the Pgf, UBI, and LBI that are used to calculate the Wanipigow Property Silica Sand Resource Estimate. A total of 17 samples were collected within the BS (correlating with the total number of samples taken equal to 761 as portrayed in Section 11); however, the BS sample results were not used in the Wanipigow Property Silica Sand Resource Estimate.

A total of 26 sample intervals did not have gradation data (i.e., non-recovery), due to: 1) poor auger return material rates that did not allow sampling; or 2) intervals identified as having >30% clay or gravel, and subsequently, were not sampled as silica sand intervals or submitted for analysis. As these missing sample intervals were within the resource domains, a reasonable value was assigned to the intervals prior to compositing rather than assigning values of zero.

The assigned missing sample values are detailed in Table 14.2. To devise the missing sample values, the authors first considered the geological material that was not collected:

1. Horizons that contained a high modal abundance of clay, mudstone or shale;

2. Weathered and/or altered Precambrian basement; and

3. Gravel units dominated by pebbles, cobbles and boulders.

In addition, the review revealed that the non-sample units were generally sporadic and therefore difficult to wireframe as continuous independent units that could be omitted from the resource estimation process. Accordingly, the authors developed two conservative samples that included:

1. A ‘clay’ sample that was devised manually by demoting or elevating the coarse and fine fractions, respectively, of the Wanipigow dataset sample that had the highest 200 plus Pan fraction (i.e., increased the fines content in the highest clay sample in the dataset); and

2. A ‘gravel’ that was devised manually by using the reverse process (i.e., elevating or demoting the coarse and fine fractions, respectively), in the Wanipigow dataset sample that had the highest +20 fraction.

In other words, a conservative clay and gravel sample was developed that ensures there is over-estimation in the resource based on the non-sample value. The decision on which value to use in the non-sample blocks were decided by reviewing the surrounding lithology; hence, the clay value, for example, was implemented in areas where the local geology necessitated the clay value. This methodology was used for 26 samples (or 3.5% of the overall samples). It is recommended that future core sampling programs collect core sample material from the entire drillhole interval to avoid non-sample areas within the resource domains for future resource estimations.

Table 14.2. Assigned ‘clay’ and ‘gravel’ sieve percentages applied to missing samples intervals that were not sampled due to >30% gravel or clay.

No Sample Type	20	30	40	50	70	140	PAN
Clay	0.1	0.4	0.8	0.3	0.8	15.5	82.3
Gravel	68	7.5	4.5	3.5	3.5	2.5	10.4

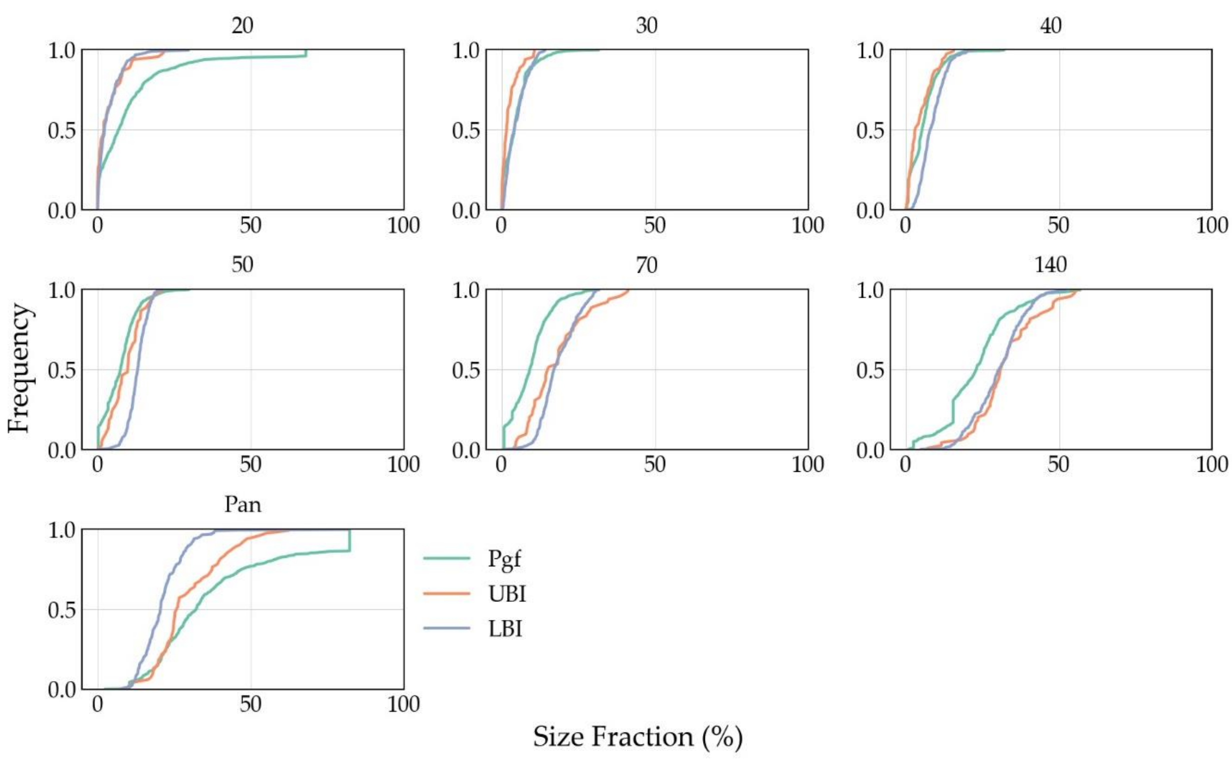
The mesh-size (U.S. Standard) fractions measured include 16-, 20-, 25-, 30-, 35-, 40, 45-, 50-, 60-, 67.5-, 70-, 80-, 100-, 120-, 137.5-, 140-, 200-mesh, and Pan.

The following size fractions are reported in Wanipigow Property Silica Sand Resource Estimate: 20/40, 30/50, 40/70, 50/140, and 70/140 as they best portray the current silica sand market from the fracking industry perspective. Size fractions between the reported size fractions were combined so that the number of variables requiring estimation is reduced. For example, the size fractions 16 is merged with 20 and the size fractions 60 and 67.5 are merged with 70.

While the 20 and Pan size fractions are not required to calculate the size fractions of economic importance, they were modeled to ensure all material is accounted for in the final block model. Figure 14.1 and Table 14.3 details the raw distribution and statistics of the size fractions that were used during the estimation of the Wanipigow Property Silica Sand Resource Estimate.

The Wanipigow Property Silica Sand Resource Estimate includes the Pgf, UBI, and the LBI. The interstitial BS was examined only to calculate an estimate of the volumes/tonnages of waste material situated within the resource.

Figure 14.1 Histograms of raw size fractions analyses completed on samples collected from the Pgf, UBI, and LBI.



14.3.2 Data QA/QC

With respect to quality assurance-quality control, the reader is referred to Section 12 Data Verification. APEX, on behalf of CPS, completed the logging and sampling programs during the CPS 2018 drilling program. The analytical methods carried out by the independent laboratories are standard and routine in the field of silica sand and proppant characterization test work and are pursuant to International Standard ISO 13503-2.

Table 14.3 Summary statistics of raw size fractions analyses completed on samples collected from the Pgf, UBI, and LBI. (Abbreviations: std – standard deviation, var – variance, CV – coefficient of variation, 25% – 25-percentile, 50% – 50-perceitnile or median, 75% – 75-percentile).

Unit	Size Fraction	count	mean	std	var	CV	min	25%	50%	75%	max
	20	548	11.23	15.17	230.00	1.35	0.00	1.18	6.86	13.84	68.00
	30	548	4.77	4.45	19.83	0.93	0.01	0.99	4.11	6.93	31.71
	40	548	5.92	4.72	22.26	0.80	0.04	1.81	5.34	8.27	32.14
Pgf	50	548	7.44	5.39	29.01	0.72	0.07	3.50	7.55	10.50	29.92
	70	548	9.32	6.32	39.99	0.68	0.36	4.12	9.18	12.95	30.59
	140	548	22.97	11.03	121.65	0.48	0.79	15.50	22.99	29.02	56.95
	Pan	548	38.37	21.84	477.02	0.57	2.53	22.37	32.21	47.13	82.30
	20	57	3.98	5.22	27.23	1.31	0.00	0.23	2.06	5.69	21.91
	30	57	2.51	2.76	7.60	1.10	0.02	0.43	1.60	3.22	10.70
	40	57	4.72	3.98	15.87	0.84	0.01	1.55	3.02	7.27	15.63
UBI	50	57	9.25	5.00	25.02	0.54	0.44	5.13	9.86	12.56	21.07
	70	57	17.61	9.38	87.97	0.53	3.93	10.37	14.97	23.33	41.30
	140	57	32.33	10.48	109.79	0.32	7.10	26.77	30.81	37.63	55.52
	Pan	57	29.60	11.36	129.08	0.38	9.70	22.40	25.84	37.36	62.40
	20	237	3.75	4.17	17.35	1.11	0.02	0.81	2.25	5.56	29.73
	30	237	4.78	3.40	11.57	0.71	0.34	1.96	4.12	6.90	14.23
	40	237	8.65	4.03	16.24	0.47	0.80	5.55	7.98	11.32	21.61
LBI	50	237	13.00	3.21	10.27	0.25	0.30	11.23	13.11	15.06	21.39
	70	237	18.36	5.98	35.72	0.33	0.80	13.94	17.08	22.82	31.80
	140	237	30.20	8.39	70.34	0.28	4.94	24.58	30.46	35.90	52.17
	Pan	237	21.27	7.65	58.44	0.36	7.51	16.51	20.52	25.04	82.30

14.3.3 MICROMINE Database and Validation

APEX prepared all data related to the resource model and estimation as Microsoft Excel spreadsheets and ArcGIS spatial and attribute data prior to importing the data into MICROMINE. The following datasets were imported into MICROMINE:

- Drillholes – the drillhole collar and down hole survey file;

- Assay file – the estimation file comprising all particle size/gradation analyses;
- Geology file – logged position of the individual litho-units/geological units; and
- LiDar survey – the bare-earth surface topography survey at 1 m resolution.

A drillhole database is then created within MICROMINE, during which the data is validated identifying omissions and discrepancies in the data. No validation errors were encountered.

As part of this Technical Report, APEX used high-resolution bare-earth LiDar as the most reliable surface model and, accordingly, to fine-tune the collar elevations (see Section 10, Drilling for changes to original non-surveyed collar elevations). No major collar elevation concerns were identified.

14.4 Estimation Domain Definition

14.4.1 Geological Interpretation and Modeling

All 93 sonic drillholes completed by CPS in 2018 have geological information such as litho-stratigraphic formation contacts and were used to model the geology at the Wanipigow Property. Stratigraphic formation tops were used to create a 3-D geological model within MICROMINE. Stratigraphic horizons modelled and wireframed in the interpretation process include the:

- Pgf, UBI, and LBI units that are the focus of this resource estimate; and
- BS that is considered waste material overlying LBI and underlying the UBI.

There is unequivocal distinction in all drillholes at the upper LBI contact and the BS shale contact (i.e., grey-white silica sand versus black shale). In the 3-D geological model, the thickness of the various units is as follows

- Pgf thickness varied from 0.1 to 23.6 m and averaged 10.7 m;
- UBI thickness varied from 0.22 m to 19.0 m and averaged 4.6 m;
- LBI thickness varied from 0.10 m to 15.9 m and averaged 7.9 m; and
- The thickness of the BS intersections varied from 0.60 m to 3.5 m and averaged 2.0 m.

With respect to flagging the non-recovery interval within a geological unit, there are rare drillhole intervals within the Pgf and LBI that had poor to no core recovery (see Table 14.1). If the areas of no core return are bounded by intervals logged as Pgf or LBI, our modeling assumes the missing interval is within the respective sandstone unit (this was also confirmed by the logging geologist). This method is acceptable, especially in these instances, because of the general lateral and vertical stratigraphic consistency of the sandstone units.

The 3-D geological wireframes of the Pgf, UBI, BS and LBI units were created by modeling 3-D sectional interpretations along drillhole fences running west-east that are used to generate solids. All drillholes except for 5 (5% of the total drillholes), penetrated the top of the underlying Precambrian basement which defines the base of the units of interest.

The 3-D geological model is clipped to the LiDar DEM surface (Figure 14.2). Once clipped, the resource surface area is 9.75 km^2 or 2,409-acres. The 3-D geological model limited to areas with drillhole control, reducing concerns of overextending the geological interpretation.

14.4.2 Block Model Parameters

The block model used for the calculation of the Wanipigow Property Silica Sand Resource Estimate fully encapsulates the Pgf, UBI, and LBI units. When determining block model parameters, data spacing is the primary consideration in addition to ensuring the volume of the 3-D geological models are adequately captured.

Drill spacing varies from zero to 554 m (zero = re-drilled hole; median drillhole spacing is 242 m). The data spacing of irregularly spaced drilling can be approximated using a block model and calculating the 90-percentile of the distance from each block's centroid to the nearest sample. Estimation errors are introduced when kriging is used to estimate grade for blocks with a size greater than 25% of the data spacing. As illustrated in Figure 14.3, the 90-percentile distance from each block's centroid to the nearest composite sample is 235 m for the Wanipigow Sand Project. The block model is validated in Section 14.4.

Based on the data spacing and the detail of the 3-D geological models, a block model with a block size of 20 m x 20 m in the horizontal directions and 2 m in the vertical direction is generated. The final block model is 4300 m long in the east-west direction, 3580 m long in the north-south direction and 84 m deep (Table 14.4). A block factor (BF) is calculated for each of the formations that represents the percentage of the block volume that lies within each formation.

Table 14.4 Wanipigow Property block model size and extent.

Axis	Number of Blocks	Parent Block Size (m)	Minimum Extent (m)	Maximum Extent (m)
X (Easting)	214	20	683990	688270
Y (Northing)	178	20	5670070	5673630
Z (Elevation)	41	2	199	281

Figure 14.2 Oblique view of modelled formations (vertical exaggeration of 7:1).

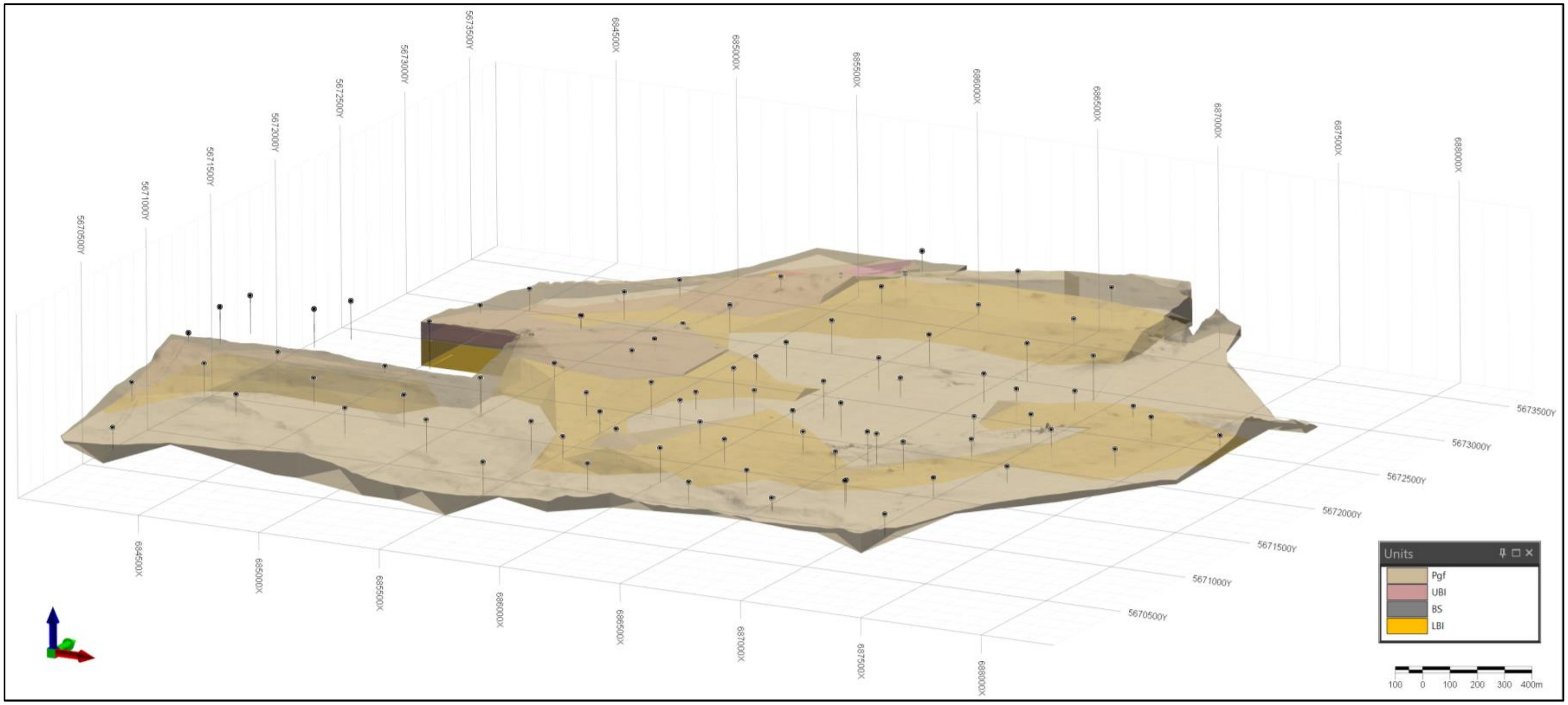
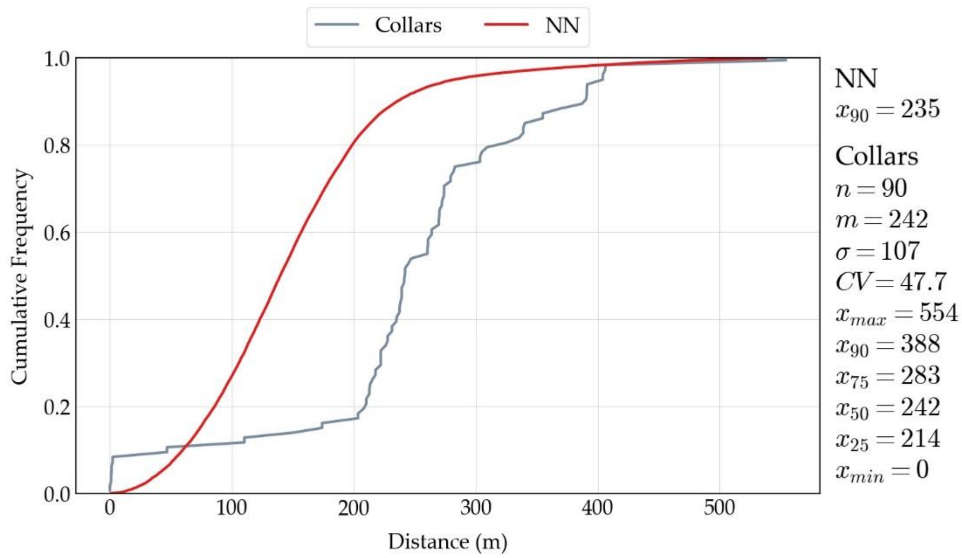


Figure 14.3 Histogram illustrating the distance from each block's centroid to the nearest composite sample (NN, red line) and the distance between each drillholes nearest neighbour (collars, blue line). Abbreviations: n – number of observations; m – mean; σ – standard deviation; CV – coefficient of variation; x_{max} – maximum value; x_{75} – 75-percentile; x_{50} – 50-percentile or median; x_{25} – 25-percentile; x_{min} – minimum value; NN – nearest neighbour; x_{90} – 90-percentile.



14.4.3 Volumetric Checks

A comparison of wireframe volume versus block model volume is performed to ensure there is no considerable over- or under-stating of tonnage (Table 14.5). The calculated block factor for each block is used to scale its volume when calculating the total volume of the block model. The volume difference is insignificant (total of 0.93%).

Table 14.5 Wireframe versus block-model volume comparison.

Unit	Wireframe Volume (m^3)	Block Model Volume (m^3)	Volume Difference (%)
BS	1,452,344	1,458,338	0.41%
Waste Total	**1,452,344**	**1,458,338**	**NA**
Pgf	104,687,877	104,694,975	0.01%
UBI	4,989,658	4,988,600	-0.02%
LBI	32,148,800	32,141,500	-0.02%
Total	**141,826,335**	**141,825,075**	**0.93%**

14.5 Grade Estimation

14.5.1 Introduction

The block model was used to calculate the Wanipigow Property Silica Sand Resource Estimate of the different percentages of silica sand retained on the various screen sizes. The mineral resources were estimated using the ordinary kriging technique. Only the composites located within the Pgf, UBI, or LBI wireframes are used to condition the grade estimate of each block located within each respective wireframe.

14.5.2 Compositing

Downhole sample length analysis shows that the drillhole samples range from 0.15 m to 2.6 m with a dominant sample length of 1.5 m. Note: the largest sample interval including non-sample intervals described in Section 14.1.1 was 9.5 m. Subsequently, a composite length of 2 m was selected as it provides adequate resolution for mining purposes and is equal to, or larger in length than 91.4% of the drillhole samples (Figure 14.4).

Length-weighted composites are calculated for all samples within the Pgf, UBI, and LBI units. The compositing process starts from the first point of intersection between the drillhole and the Pgf, UBI, or LBI wireframes and is stopped upon intersection with the bottom of the Pgf, UBI, or LBI wireframe. No composites are calculated that straddle the contacts between the Pgf, UBI, or LBI units.

Instead of enforcing a maximum composite length of 2 m, compositing is completed in a manner that redistributes the composite interval to minimize the number of composites that are less than 1 m in length, also known as orphans. This compositing method does cause some composites with lengths greater than 2 m. However, it is believed that maximizing the number of composites that are approximately 2 m, in favour of maintaining a strict maximum composite length of 2 m, mitigates error introduced to the model.

The final lengths of the calculated composites are illustrated in Figure 14.5. It is common practice to use only composites with lengths equal to or greater than half of the selected composite length (2 m) for resource estimation. There are 4 composites with lengths less than 1 m; however, as there are so few and that they represent the units in areas where they pinch out, they are not removed.

Figure 14.6 and Table 14.6 detail the composted distribution and statistics of each size fraction used during the estimation of the Wanipigow Property Silica Sand Resource Estimate. The composited samples were used for all sample statistics, capping, estimation input file and validation comparisons.

Figure 14.4 Histogram of raw drillhole sample lengths within the Pgf, UBI, and LBI units. Abbreviations: n – number of observations; m – mean; σ – standard deviation; CV – coefficient of variation; x_{max} – maximum value; x_{75} – 75-percentile; x_{50} – 50-percentile or median; x_{25} – 25-percentile; x_{min} – minimum value.

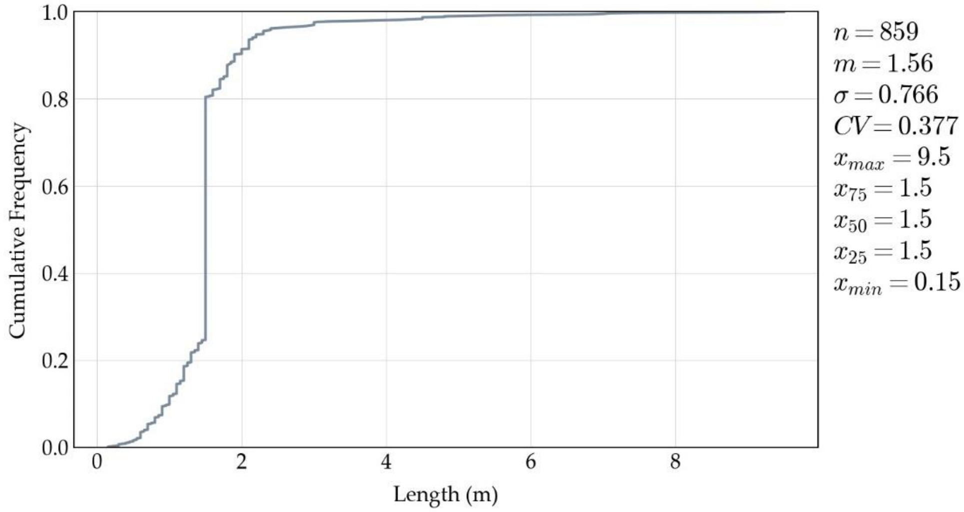


Figure 14.5 Histogram of composite sample lengths within the Pgf, UBI, and LBI units. Abbreviations: n – number of observations; m – mean; σ – standard deviation; CV – coefficient of variation; x_{max} – maximum value; x_{75} – 75-percentile; x_{50} – 50-percentile or median; x_{25} – 25-percentile; x_{min} – minimum value.

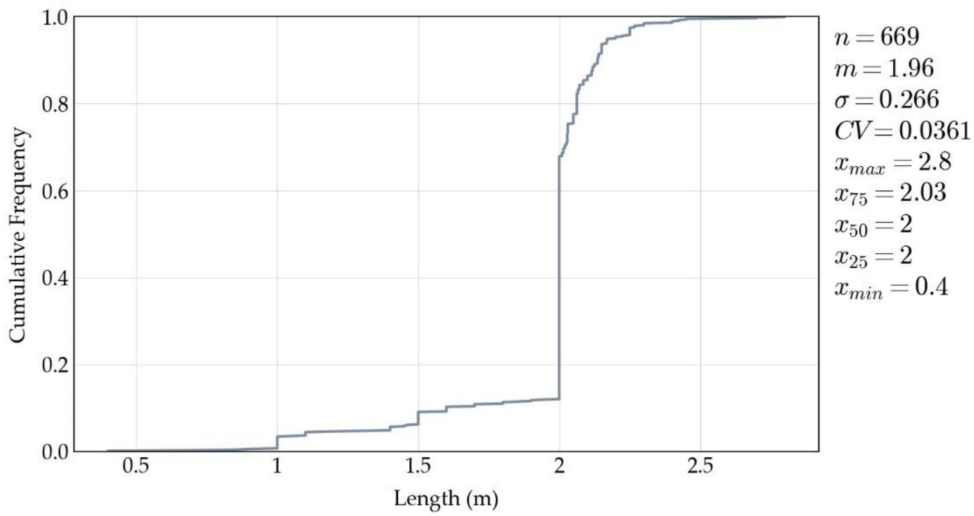


Figure 14.6 Histograms of the composited size fractions analyses completed on samples collected from the Pgf, UBI, and LBI units.

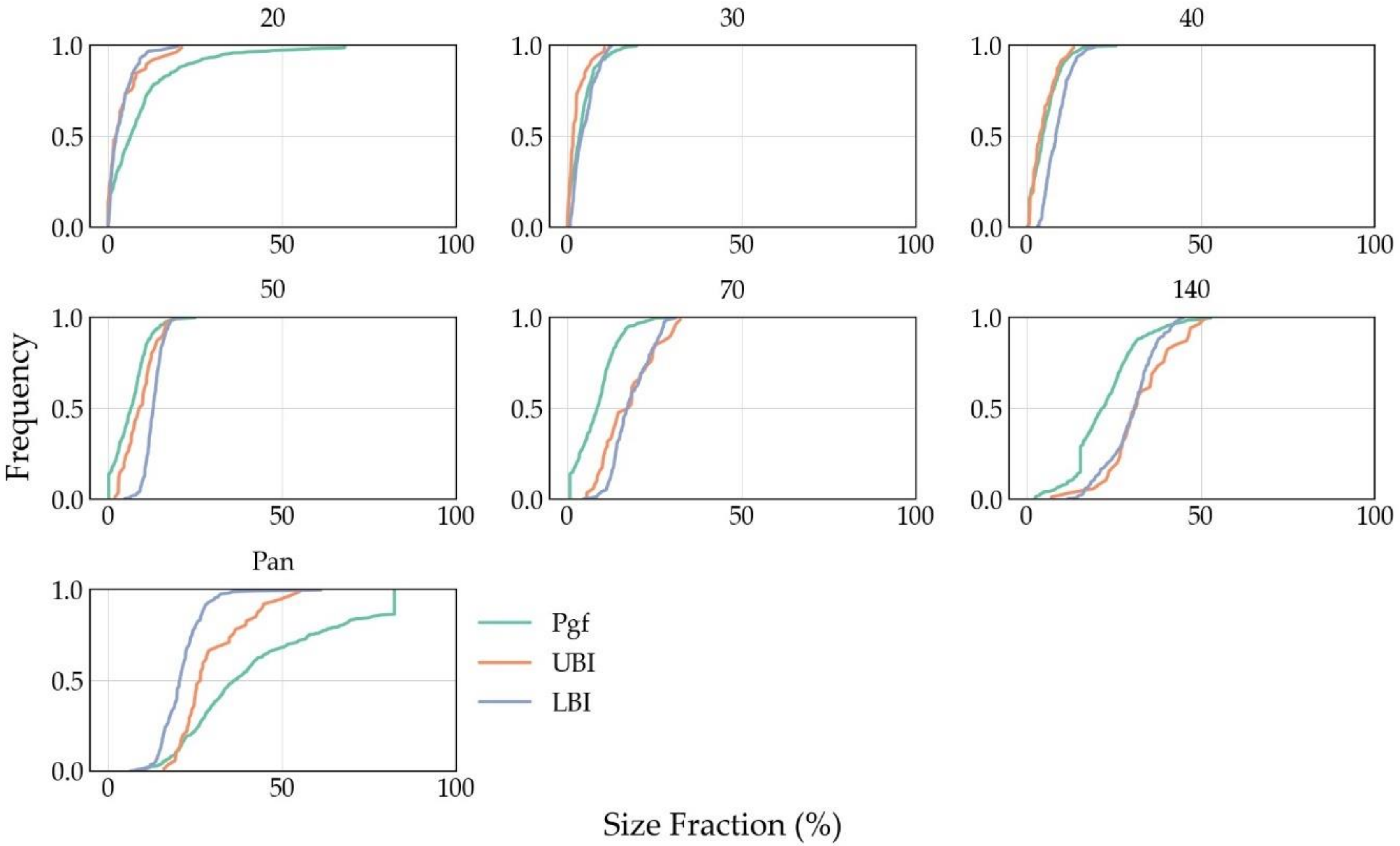


Table 14.6 Summary statistics of composited size fractions analyses completed on samples collected from the Pgf, UBI, and LBI units. Abbreviations: std – standard deviation, var – variance, CV – coefficient of variation, 25% – 25-percentile, 50% – 50-perceitnile or median, 75% – 75-percentile.

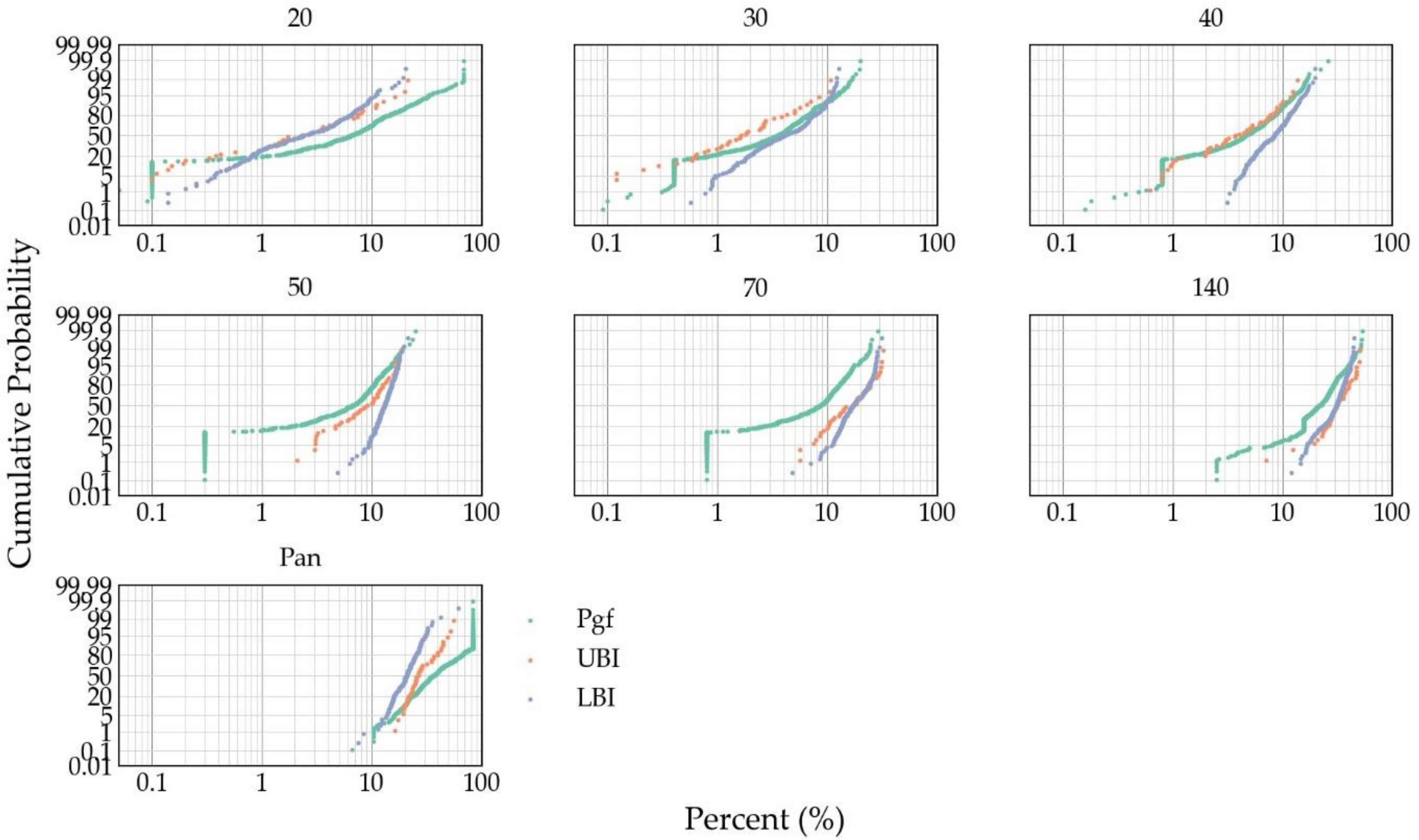
Unit	Size Fraction	count	mean	std	var	CV	min	25%	50%	75%	max
Pgf	20	448	9.93	12.36	152.86	1.25	0.01	1.93	6.48	11.99	68.00
	30	448	4.25	3.74	13.97	0.88	0.09	1.20	3.54	5.88	20.04
	40	448	5.33	3.99	15.91	0.75	0.16	2.08	4.60	7.51	25.72
	50	448	6.69	4.69	21.96	0.70	0.30	2.82	6.64	9.65	25.09
	70	448	8.51	5.64	31.80	0.66	0.80	3.62	8.64	11.96	29.06
	140	448	22.42	9.40	88.36	0.42	2.50	15.50	21.77	27.82	52.89
	Pan	448	42.92	21.86	477.69	0.51	6.58	26.18	36.33	57.86	82.30
UBI	20	43	4.33	5.27	27.81	1.22	0.05	0.78	2.30	5.92	21.21
	30	43	2.62	2.66	7.08	1.02	0.04	0.80	1.64	3.02	10.70
	40	43	4.74	3.46	11.96	0.73	0.62	2.08	3.74	7.10	13.56
	50	43	9.12	4.34	18.84	0.48	2.08	5.66	9.02	11.96	18.38
	70	43	17.34	7.66	58.64	0.44	5.62	10.73	17.52	23.34	32.52
	140	43	32.26	9.47	89.74	0.29	7.10	26.92	31.28	38.51	50.82
	Pan	43	29.59	9.78	95.70	0.33	16.12	23.14	26.59	35.51	55.16
LBI	20	178	3.78	3.77	14.22	1.00	0.14	0.92	2.39	5.44	20.24
	30	178	4.88	3.13	9.78	0.64	0.57	2.18	4.12	6.86	12.73
	40	178	8.78	3.55	12.62	0.40	3.13	5.87	8.38	10.89	19.60
	50	178	13.08	2.55	6.52	0.20	4.88	11.51	13.04	14.75	21.39
	70	178	18.29	5.50	30.24	0.30	4.81	13.88	17.22	23.03	31.10
	140	178	30.02	7.25	52.51	0.24	11.94	25.70	30.86	34.95	44.91
	Pan	178	21.18	6.14	37.70	0.29	7.51	16.91	20.66	24.22	61.20

14.5.3 Capping

To ensure the size fractions are not overestimated, outlier values that appear higher than expected, relative to the global population, are replaced with a maximum cap value. Extreme outlier values are valid measurements; however, their spatial continuity is limited compared to the global population, and without treatment, they unreasonably influence the calculated average value.

A probability plot illustrating all raw sieve measurements is used to identify outlier values. Figure 14.7 illustrates a probability plot for each of the size fractions being estimated. Each sample is displayed as a single point with outliers being those that breakaway at the high end of the distribution from the low angle (toward higher values) relative to the denser points. No extreme values that require treatment were identified; therefore, no capping was applied.

Figure 14.7 Probability plots of all composited size fractions analyses completed on samples collected from the Pgf (green dots), UBI (orange dots), and LBI (blue dots) units.



14.5.4 Variography

The authors calculated and modelled semi-variograms for selected size fractions using the 2 m composites flagged within the Pgf and LBI wireframes. A variogram could not be modeled for the UBI due to the limited number of composites within the unit. Given the flat lying nature each unit and the lack of horizontal anisotropy, the variograms for all size fractions are modeled using an omnidirectional horizontal semi-variogram and a vertical semi-variogram. Experimental semi-variograms were calculated along the horizonal plane and vertical principle directions of continuity as defined by three Euler angles.

Euler angles describe the orientation of anisotropy as a series of rotations (using a left-hand rule) that are as follows:

1. A rotation about the Z-axis (azimuth) with positive angles being clockwise rotation and negative representing counter clockwise rotation;

2. A rotation about the X-axis (dip) with positive angles being counter clockwise rotation and negative representing clockwise rotation; and

3. A rotation about the Y-axis (tilt) with positive angles being clockwise rotation and negative representing counter clockwise rotation.

Parameters of the modeled variograms are documented in Tables 14.7 and 14.8 and the calculated semi-variogram and models for each size fraction are illustrated in Figures 14.8 and 14.9.

The LBI variograms are well defined, the only exception being the horizontal model for the 50-mesh. However, the Pgf is not as continuous reducing the confidence in the horizontal variograms for all size fractions within the unit. As the UBI is closest geologically to the LBI, the LBI variogram is used when estimating size fractions within the UBI unit.

14.5.5 Bulk Density

A total of 58 bulk density samples were collected to determine the loose bulk density of the Pgf (n=13 samples), UBI (n=3 samples), BS (n=6 samples), and LBI (n=36 samples). The loose bulk densities were converted to an *in-situ* bulk sand density by utilizing a bulking factor of 30% (see section 11.4). This was done to best replicate the *in-situ* resource of the Winnipeg Formation and overlying Pleistocene surficial material. The bulk density correlates with any potential future mining process that would sample entire sections of bedrock material. The average *in-situ* density of the bulk sand at the Wanipigow Property was determined to be 1.897 g/cm^3, 1.911 g/cm^3, and 1.878 g/cm^3 the Pgf, UBI, and LBI units respectively (Table 14.9). These density values were used in the resource calculation to estimate the tonnage of sand in the units of interest. The *in-situ* bulk density of the interstitial BS unit is 1.814 g/cm^3.

Table 14.7 Variogram model parameters of each size fraction estimated within the Pgf unit.

						Structure 1					Structure 2				
								Ranges					Ranges		
Variable	Azm	Dip	Tilt	Nugget Effect	Sill	Type	Covariance Contribution	Major	Minor	Vertical	Type	Covariance Contribution	Major	Minor	Vertical
20	0	0	0	0	103.18	Exponential	87.70	600	600	8	Spherical	15.48	1500	1500	10
30	0	0	0	0	14.73	Exponential	13.26	400	400	7	Spherical	1.47	1500	1500	7
40	0	0	0	1.53	15.31	Exponential	7.65	400	400	7	Spherical	6.12	700	700	7
50	0	0	0	3.34	16.71	Spherical	13.37	550	550	6.5	-	-	-	-	-
70	0	0	0	2.40	23.97	Exponential	7.19	350	350	5	Spherical	14.38	550	550	10
140	0	0	0	9.20	92.02	Exponential	73.62	300	300	9	Spherical	9.20	900	900	9
Pan	0	0	0	19.39	193.90	Exponential	116.34	400	400	10	Spherical	58.17	800	800	10

Table 14.8 Variogram model parameters of each size fraction estimated within the LBI unit.

						Structure 1					Structure 2				
								Ranges					Ranges		
Variable	Azm	Dip	Tilt	Nugget Effect	Sill	Type	Covariance Contribution	Major	Minor	Vertical	Type	Covariance Contribution	Major	Minor	Vertical
20	0	0	0	0	13.27	Spherical	13.27	1900	1900	10	-	-	-	-	-
30	0	0	0	0	9.59	Exponential	2.88	600	600	8	Spherical	6.71	2200	2200	8
40	0	0	0	0	12.55	Exponential	6.28	600	600	7	Spherical	6.28	1800	1800	7
50	0	0	0	0	6.58	Exponential	5.26	600	600	4	Spherical	1.32	600	600	9
70	0	0	0	0	30.16	Spherical	30.16	2000	2000	8.5	-	-	-	-	-
140	0	0	0	0	52.24	Exponential	31.34	500	500	6	Spherical	20.89	1900	1900	6
Pan	0	0	0	3.74	33.64	Exponential	18.69	500	500	6	Spherical	14.95	1500	1500	9

Figure 14.8 Calculated and modeled semi-variograms (horizontal omnidirectional and vertical) for each sand fraction of interest within the Pgf unit.

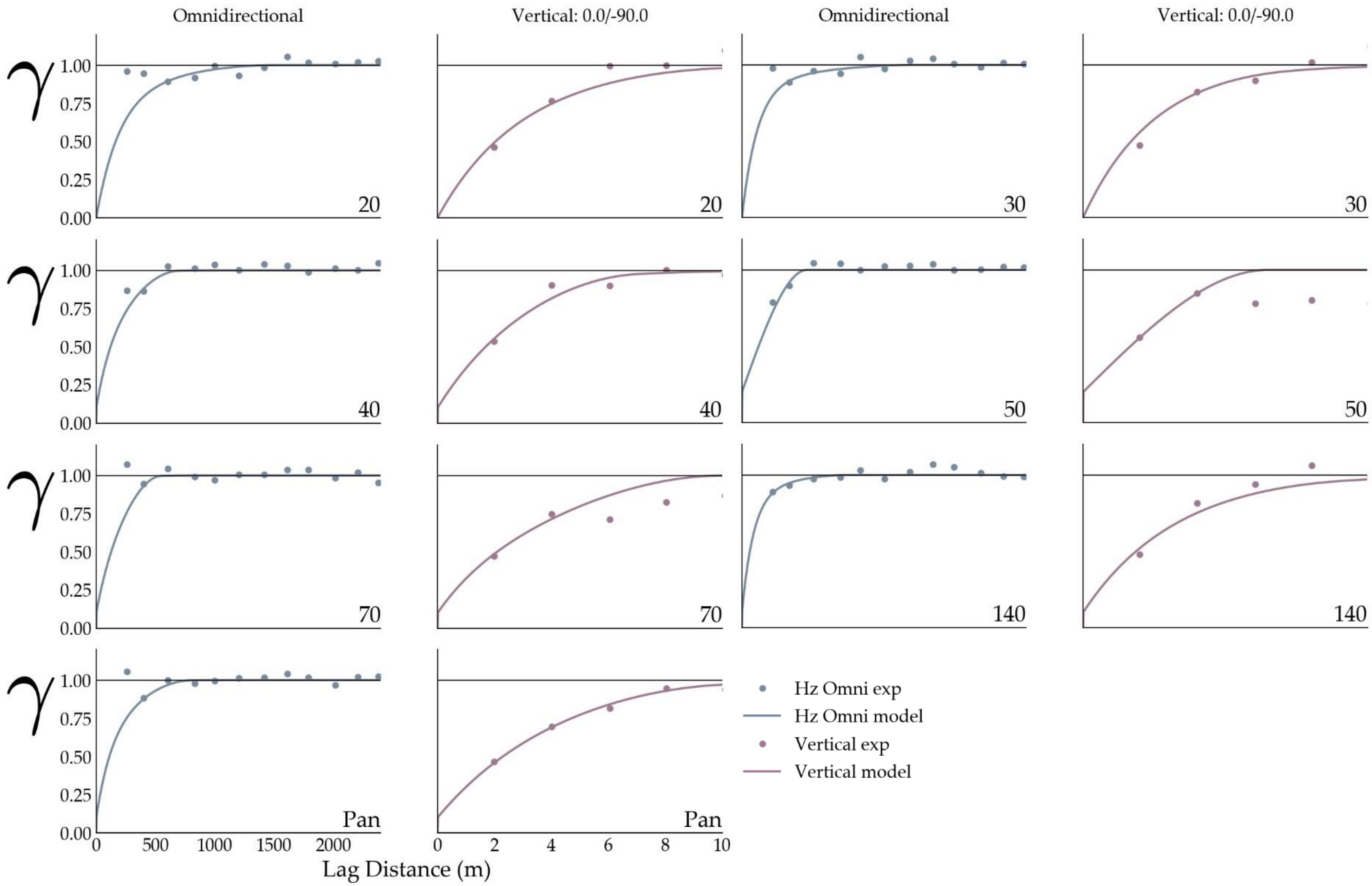


Figure 14.9 Calculated and modeled semi-variograms (horizontal omnidirectional and vertical) for each sand fraction of interest within the LBI unit.

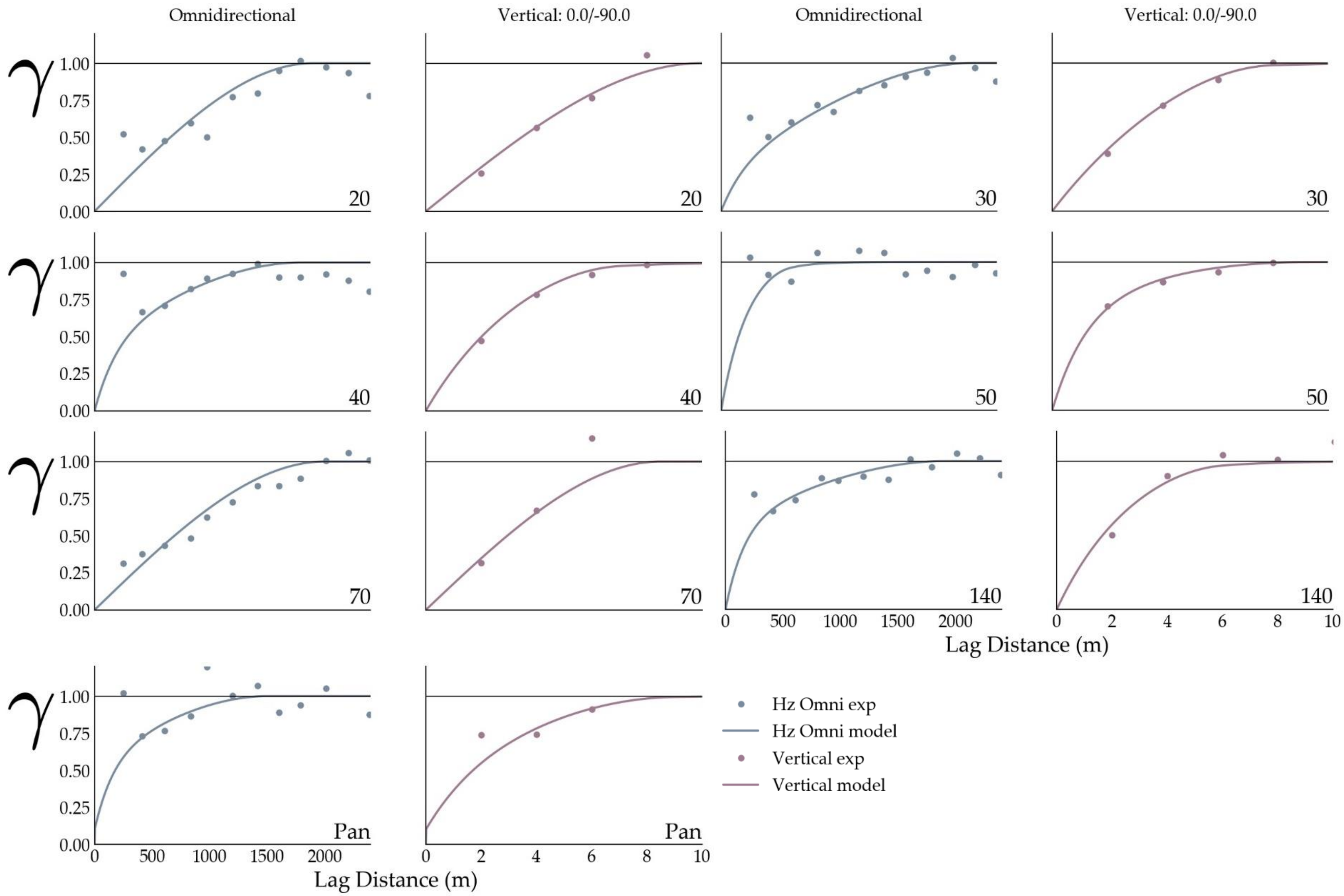


Table 14.9 Summary of density analysis from samples collected during CPS' 2018 drillhole program. The grey-shaded average compacted densities were used in the resource estimations presented in this Technical Report.

Lithology	Count	Average loose bulk density (g/cm^3)	Average compacted bulk density (g/cm^3) [1]
Pleistocene glaciofluvial	13	1.459	1.897
Black Shale	6	1.395	1.814
Upper Black Island	3	1.470	1.911
Lower Black Island	36	1.444	1.878

[1] Utilizing a 30% bulking factor (Mr. R. Farmer, pers. comm., 2019).

14.5.6 Estimation Methodology

Ordinary Kriging (OK) was used to estimate the size fraction values at each parent block that lies within the Pgf, UBI, and LBI wireframe. Blocks within each formation are conditioned using only composites within the same formation. The search ellipse orientation and ranges are defined by the variography described in Section 14.4.2.

Volume-variance corrections are enforced by: 1) restricting the maximum number of conditioning values to 15; and 2) restricting the maximum number of conditioning values from each drill hole by 3 (for all size fractions). These restrictions are implemented to ensure the estimated models are not over-smoothed, which would lead to inaccurate estimation of global tonnage and grade.

These corrections can cause local conditional bias, but the technique is implemented to ensure that the global estimate of grade and tonnes in the Wanipigow Resource Estimate is accurate.

14.6 Block Model Validation

14.6.1 Visual Validation

The blocks are visually validated in plan view and in cross-section to compare the estimated block size fractions versus the sample composite size fractions. Example cross-sections of this visual validation process – for both the geological wireframing (Pgf, UBI, and LBI and BS waste rock) and composited and estimated size fractions – is presented in Figures 14.10 and 14.11. Overall, the estimated block size fractions compare well with the composite size fractions.

Figure 14.10 Cross-section along 5671600 m North between selected drillholes to show an example of the 3-D geological and block model. The image illustrates the Pgf (tan), UBI (pink), BS (grey) and LBI (yellow), and the interstitial BS wireframe. Vertical exaggeration of 7:1.

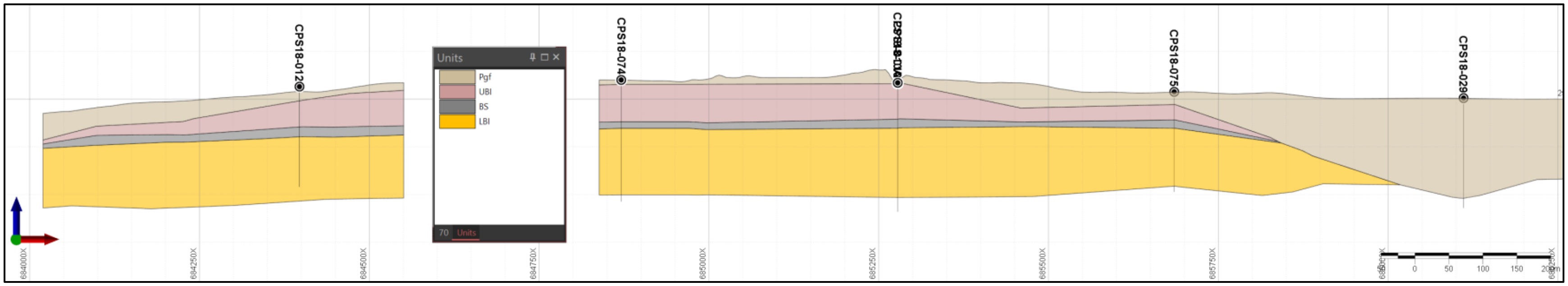
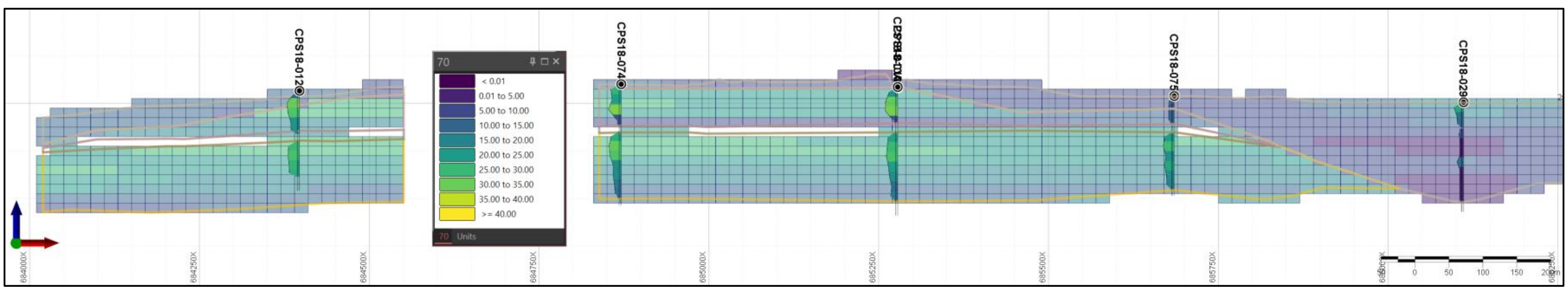


Figure 14.11 Cross-section along 5671600 m North between selected drillholes to show an example of the 3-D geological and block model. The below image illustrates the estimated 70-mesh values compared to composited data. Vertical exaggeration of 7:1.



14.6.2 Statistical Validation

Swath plots are used to verify that directional trends are honoured in the estimated model and identify potential areas of over- or under-estimation. They are generated by calculating the average size fraction between the composites and estimated models within east-west, north-south and vertical slices. The averages are calculated within directional slices: a window of 20 m is used in the east-west and north-south, and 2 m for the vertical slices. These figures are presented as follows:

- East-west, north-south and vertical swath plots for Pgf (Figures 14-12, 14-13 and 14-14);
- East-west, north-south and vertical swath plots for UBI (Figures 14-15, 14-16 and 14-17); and
- East-west, north-south and vertical swath plots for LBI (Figures 14-18, 14-19 and 14-20).

Overall, the trend observed in the composite data for the Pgf, UBI, and LBI units is reasonably reproduced – particularly in the vertical direction. While the block model trend in the east-west and north-south is relatively flat, the authors suspect variation in the vertical trend essentially models cyclicity within the depositional environment.

Figure 14.12 East-west swath plots comparing composite versus estimated size fractions within the Pgf unit.

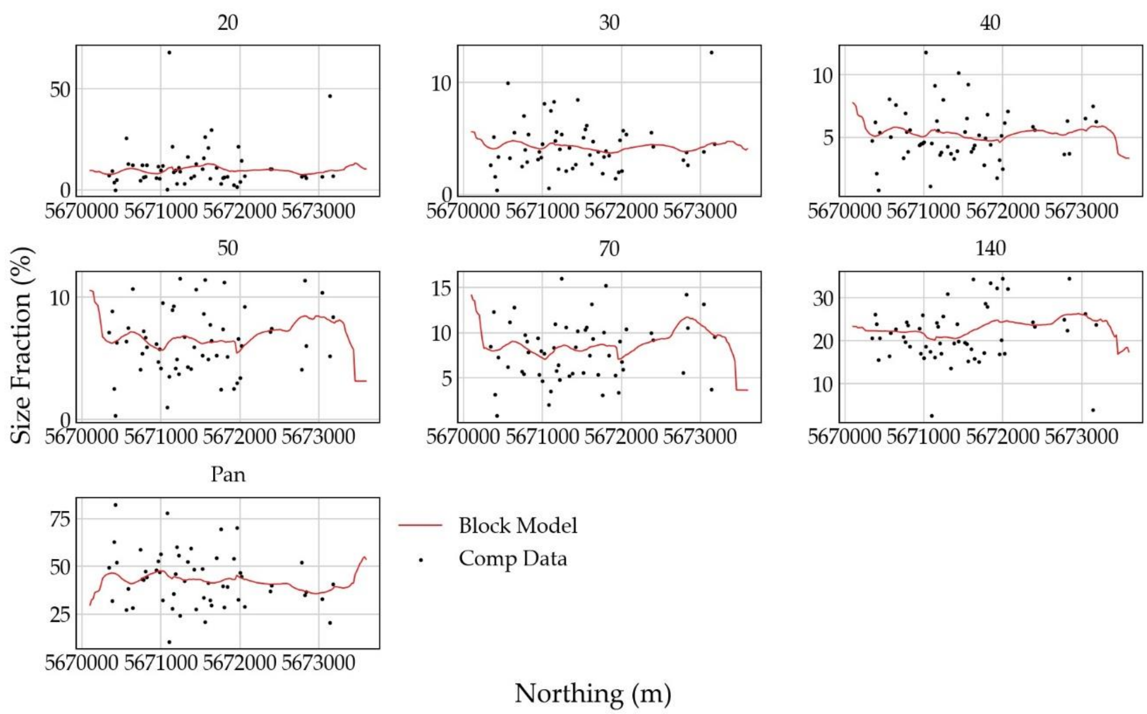


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Figure 14.13 North-south swath plots comparing composite versus estimated size fractions within the Pgf unit.

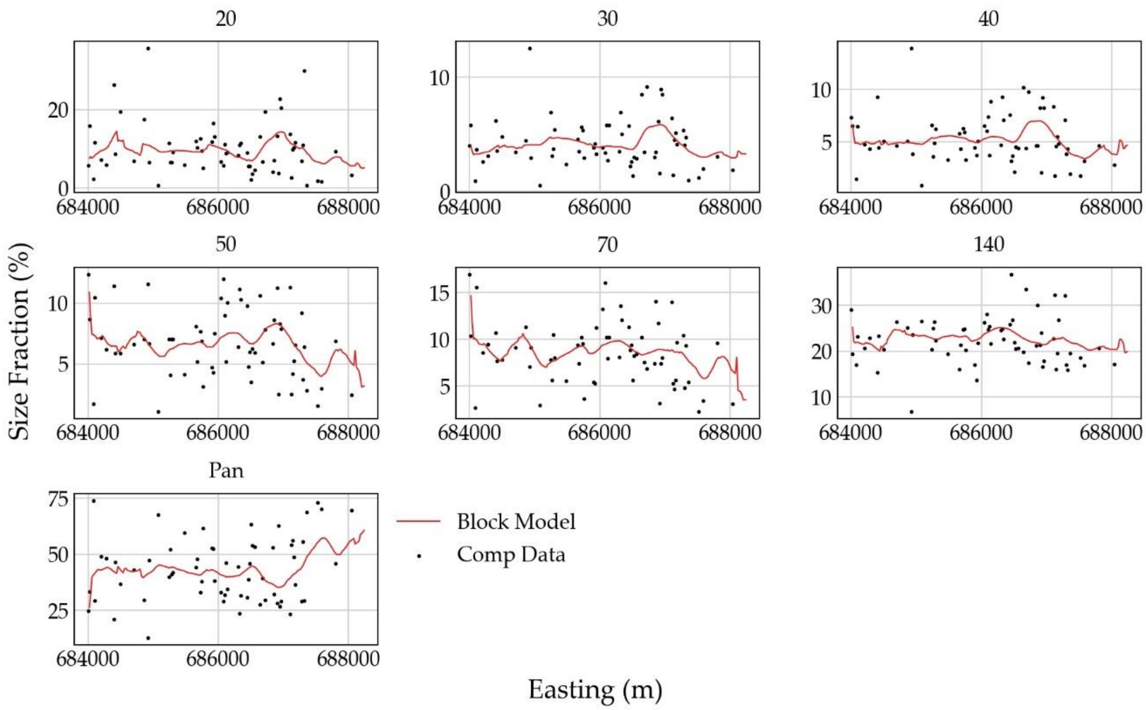


Figure 14.14 Vertical swath plots comparing composite versus estimated size fractions within the Pgf unit.

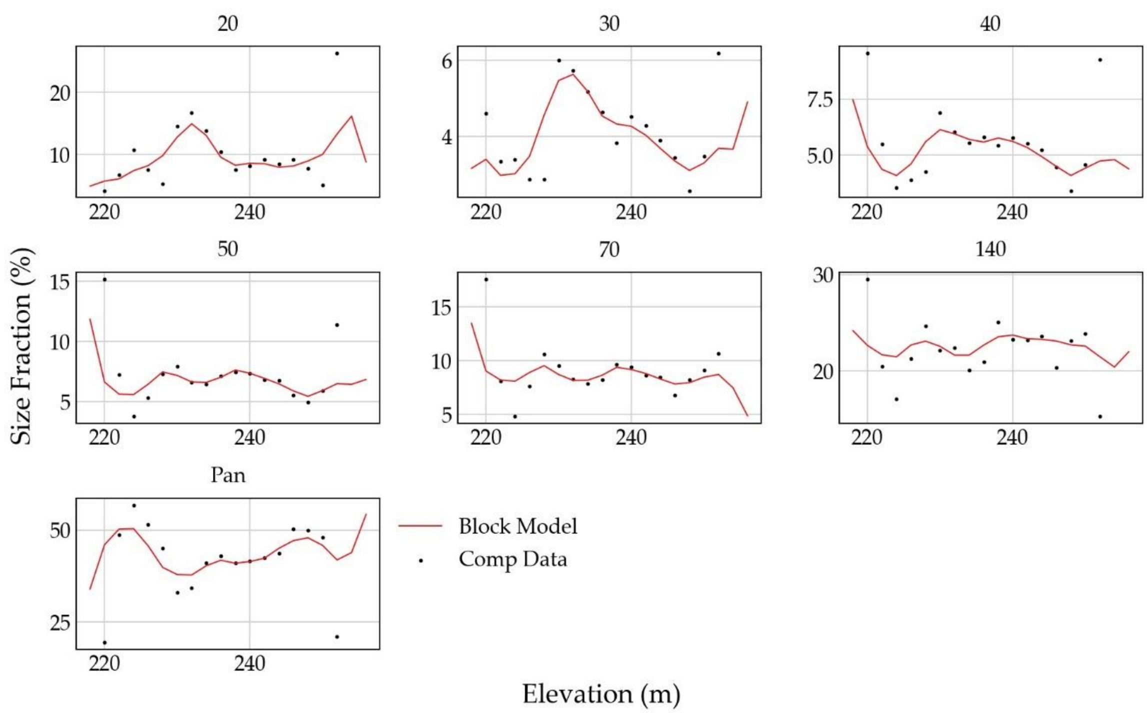


Figure 14.15 East-west swath plots comparing composite versus estimated size fractions within the UBI unit.

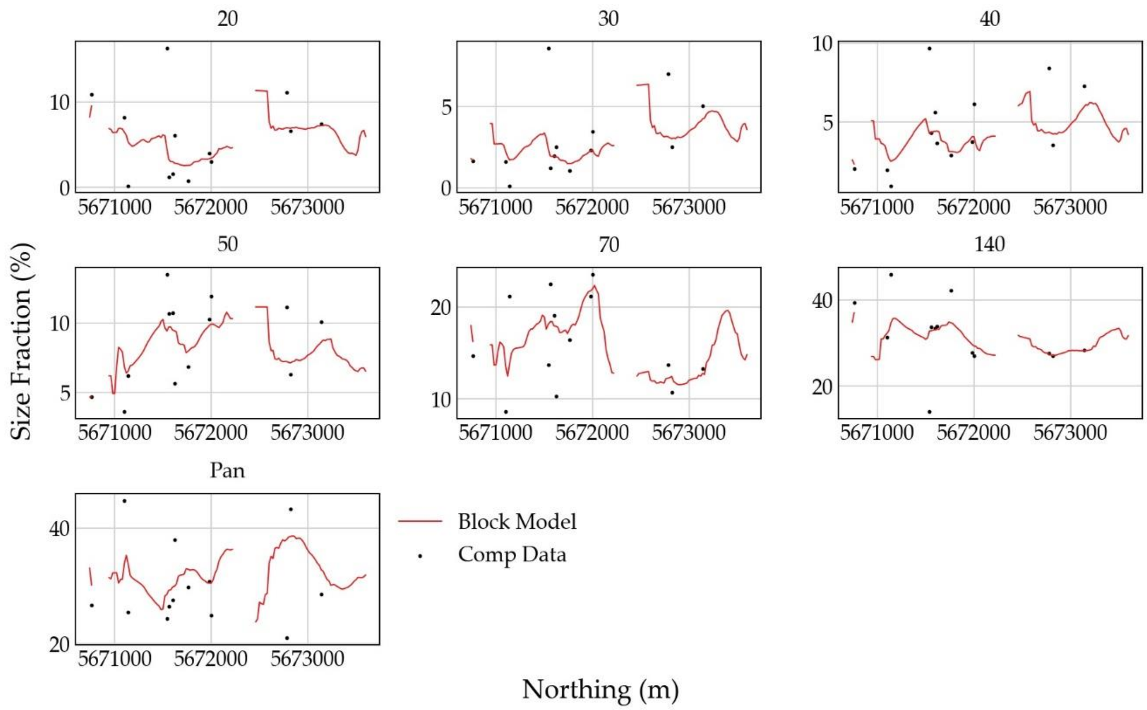


Figure 14.16 North-south swath plots comparing composite versus estimated size fractions within the UBI unit.

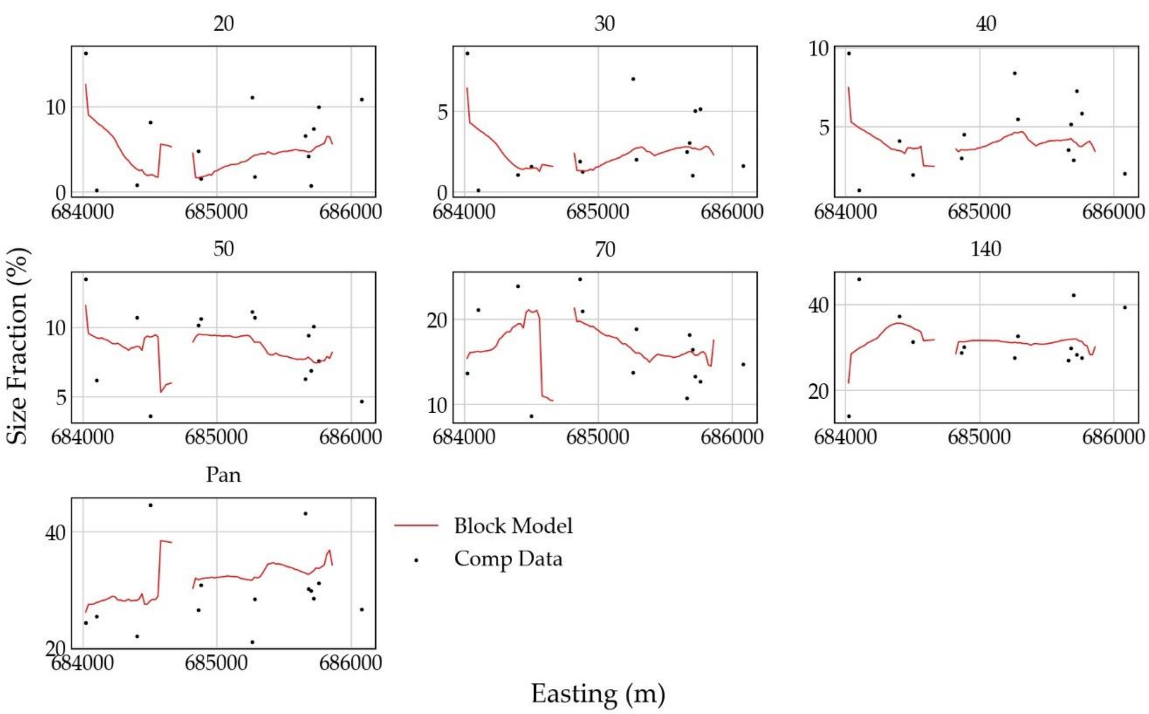


Figure14.17 Vertical swath plots comparing composite versus estimated size fractions within the UBI uni.

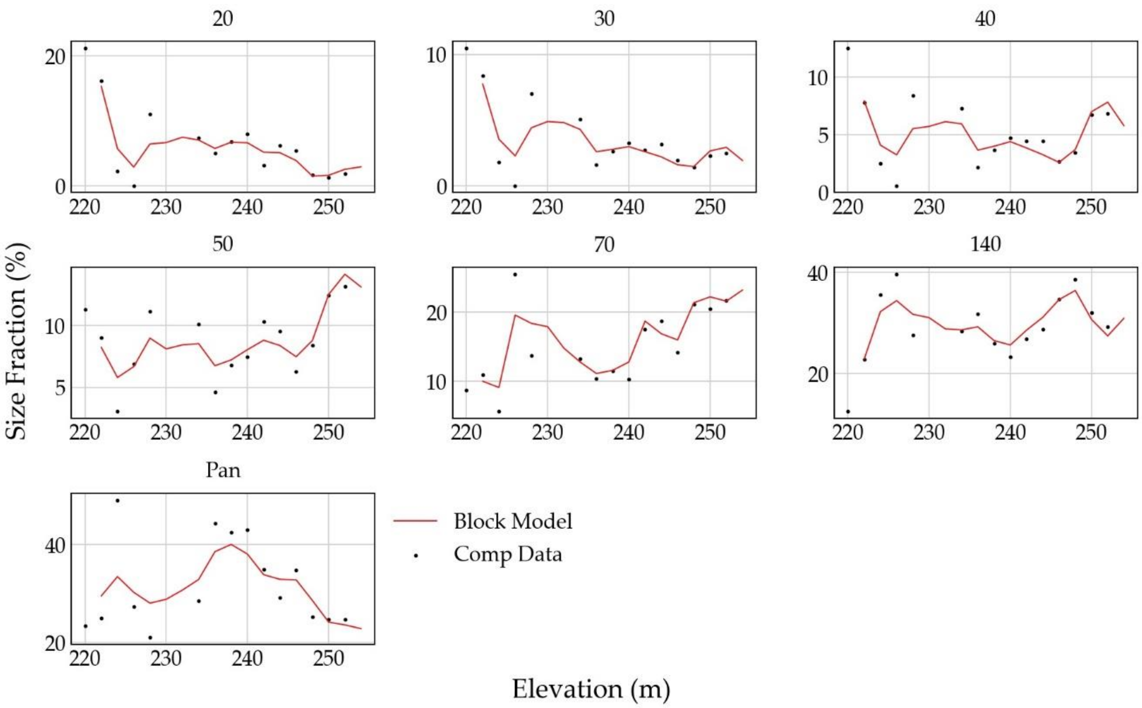


Figure 14.18 East-west swath plots comparing composite versus estimated size fractions within the LBI unit.

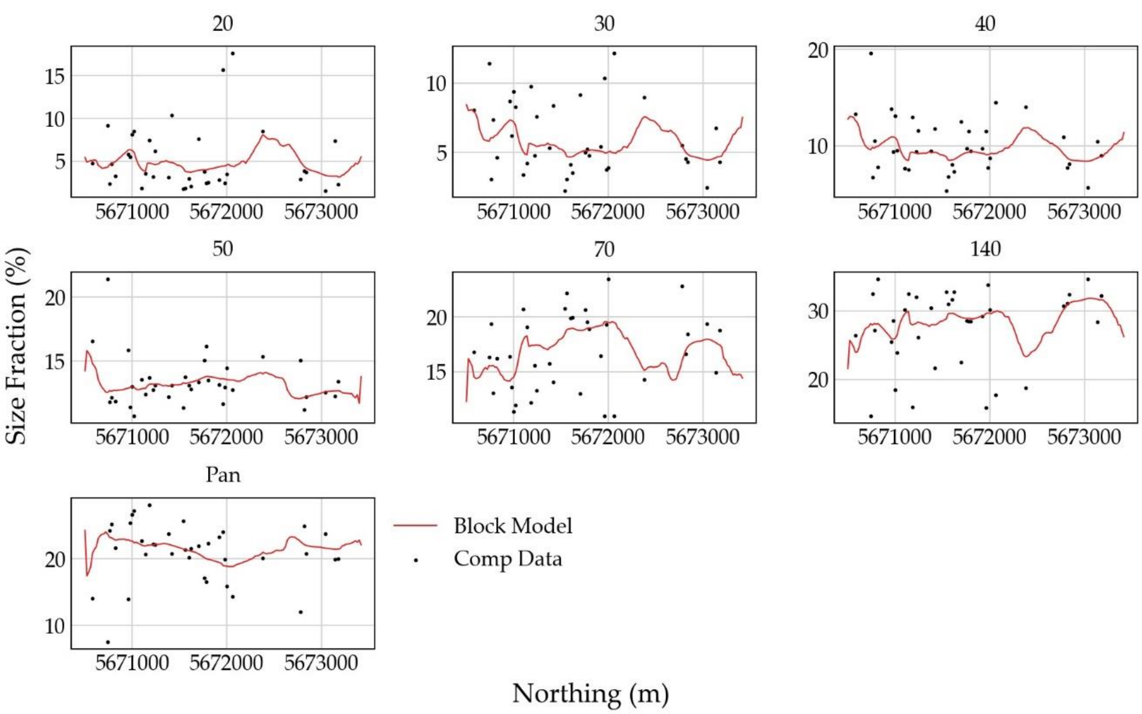


Figure 14.19 North-south swath plots comparing composite versus estimated size fractions within the LBI unit.

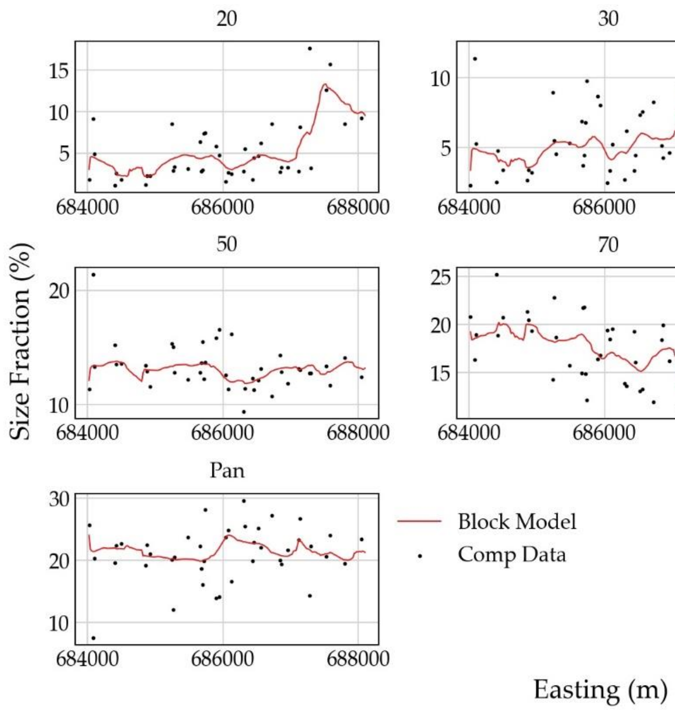
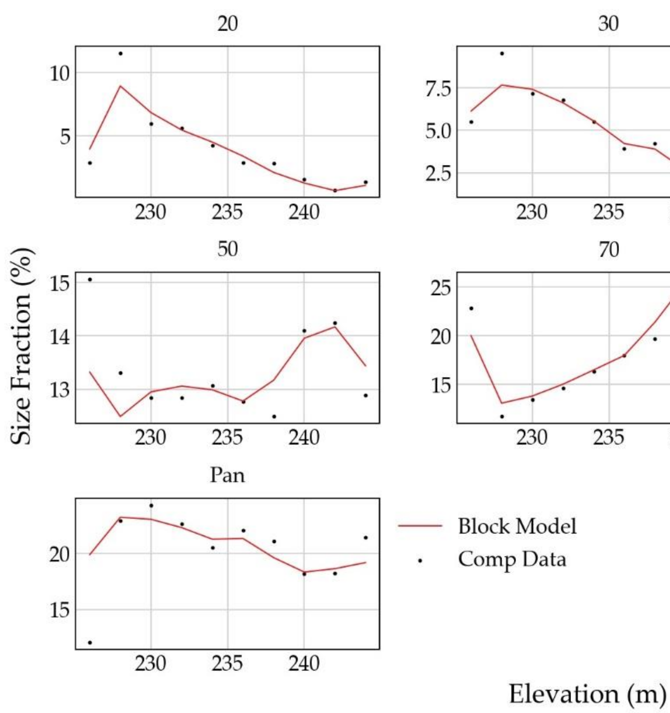


Figure14.20 Vertical swath plots comparing composite versus estimated size fractions within the LBI uni.



Histograms of the size fractions from the composites and the estimated block model are plotted to ensure the final model is not over- or under-smoothed and to check that the histogram of the block model compares well to the input data.

These figures are presented as follows:

- Pgf histogram is presented in Figure 14-21;
- UBI histogram is presented in Figure 14-22; and
- LBI histogram is presented in Figure 14-23.

All size fractions appear to show good correlation between the block model and the input data. Some smoothing, as designated by the slope of the curve, is associated with, for example, the Pgf 30-mesh through to 140-mesh, UBI 50-mesh and Pan and LBI 140-mesh.

Figure 14.21 Histograms of each size fraction comparing composite versus block model distributions within the Pgf unit.

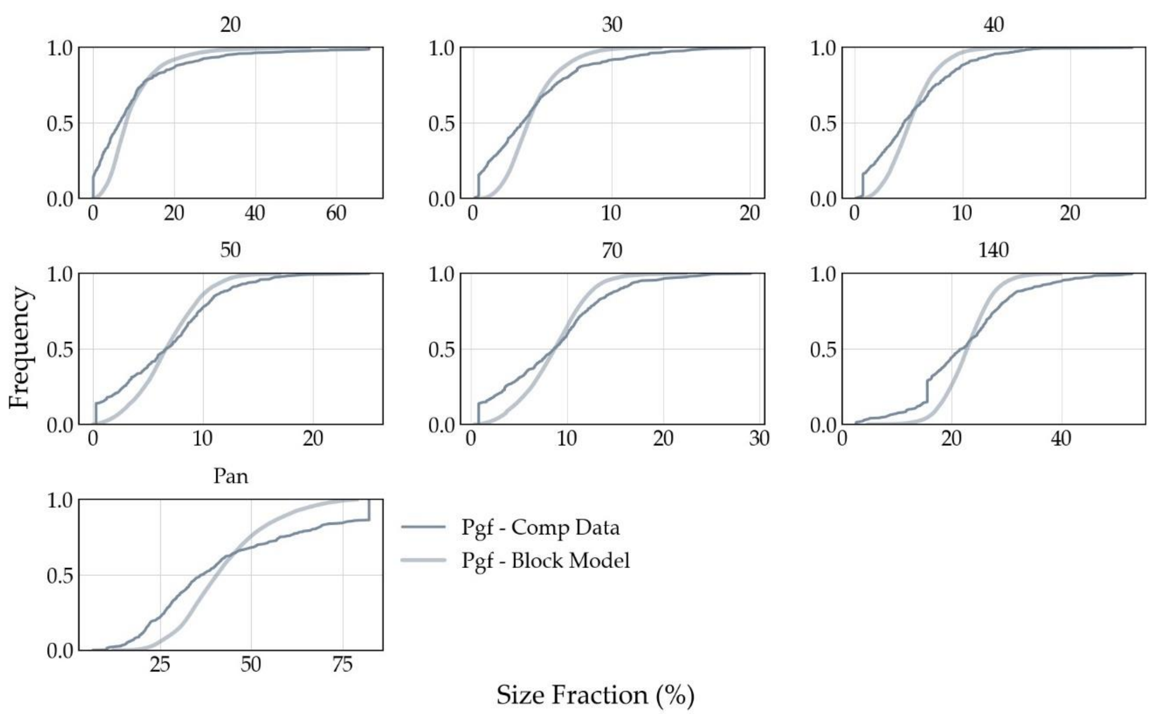


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Figure 14.22 Histograms of each size fraction comparing composite versus block model distributions within the UBI unit.

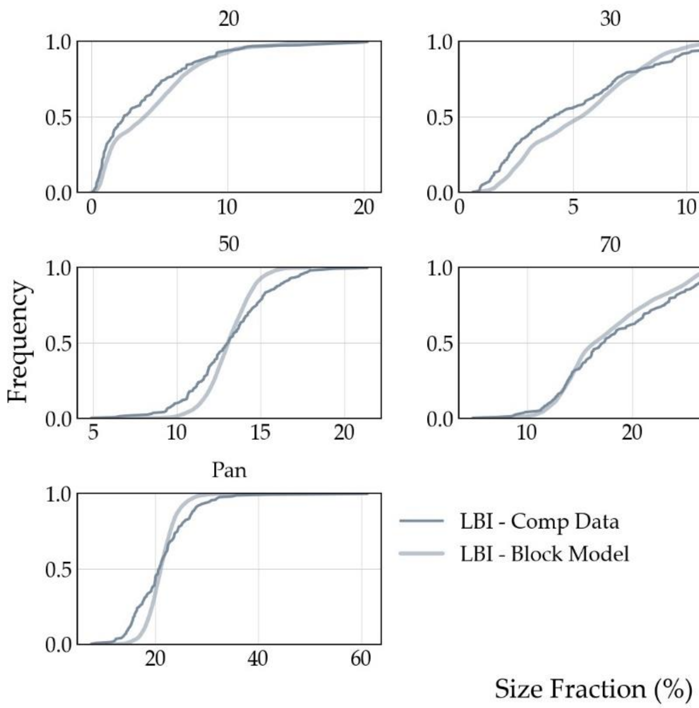
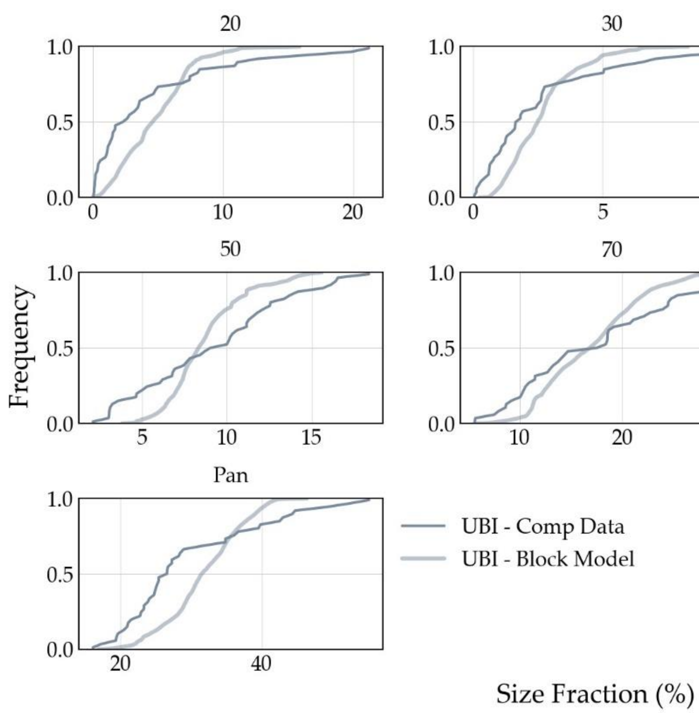


Figure 14.23 Histograms of each size fraction comparing composite versus block model distributions within the LBI unit.



14.7 Mineral Resource Estimate

14.7.1 Definition of Mineral Resource

The Wanipigow Property Silica Sand Resource Estimate has been classified by the senior author and QP in accordance with guidelines established by the CIM "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" dated November 29th, 2019, and the CIM "Definition Standards for Mineral Resources and Mineral Reserves" amended and adopted May 10th, 2014. The authors considered all resource classification levels, which in order of increasing geological confidence, are defined as:

> ***"Inferred Mineral Resource*** *is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.*
>
> *An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.*
>
> ***Indicated Mineral Resource*** *is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.*
>
> *Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.*
>
> *An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.*
>
> ***Measured Mineral Resource*** *is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.*
>
> *Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.*

A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve."

Modifying Factors considerations used to convert Mineral Resources to Mineral Reserves include but are not restricted to mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

14.7.2 Resource Classification Methodology

The Wanipigow Property Silica Sand Resource Estimate is classified according to the CIM definition standards. The authors have considered several factors for the Mineral Resource classification of the Pgf, UBI and LBI units from the Wanipigow Sand Project. These include but are not limited to the following factors: drillhole spacing; nature of the geological contacts; the degree of testing; proppant quality, and lateral and vertical continuity. These factors serve as a proxy for geological confidence and the level of uncertainty of the individual units.

Drill spacing is more-or-less consistent throughout the Wanipigow Property and for all assessed geo-units. Nevertheless, focussing on CPS's 2018 exploration campaign and as discussed in Section 14.2.2, the drill spacing 90-percentile distance from each block's centroid to the nearest composite sample is 235 m for the Wanipigow Sand Project (see Figure 14.3). It is the senior author's opinion that this level of drill spacing is adequate to take a non-structurally altered, laterally consistent WCSB rock stratigraphy such as the Ordovician Black Island Member to any level of resource classification. The final level of classification must, therefore, consider the other geological confidence and uncertainty factors for silica sand resource classification.

In accordance with this introduction and assessment by the authors and QP's, various resource classification levels have been assigned by the senior author to the Wanipigow and Project geo-units. These include from highest to lowest classification:

Lower Black Island – Measured Resource (with areas of Indicated Resource)

- Geologically, the upper and lower contacts of the LBI are very well-defined using data from CPS's 2018 drill program. There is an unequivocal distinction in all drillholes as to the specific location the upper and lower LBI contacts. The overlying contact is sharply defined by LBI grey-white silica sand in contrast to black shale of the BS. The basal contact is LBI sitting unconformably on to equally contrasting Precambrian crystalline basement rocks.

- The upper and lower LBI contact confidence levels are such that it is reasonable to confidently predict the LBI contacts with future infill drilling within the CPS 2018 drill and resource estimation area.

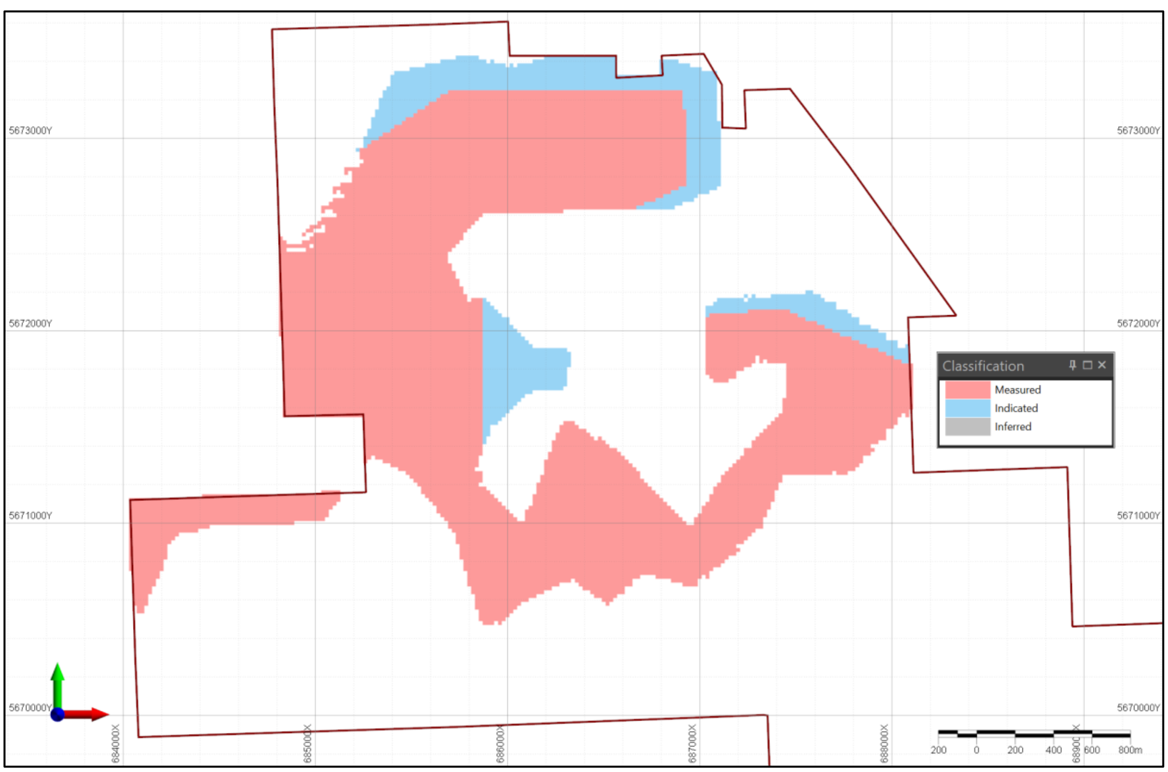
- The LBI unit represents the best sampled and analytically tested bedrock geo-unit in this study. A total of 236 LBI samples were collected and analyzed for particle size distributions. Over 270 Krumbein shape tests and crush tests were performed on LBI sand. The gradation and proppant characterization test work show that the LBI sand meets the ISO/API criteria for proppant (see section 13).

- The particle size distribution of the LBI sand, and the Krumbein and crush quality of the LBI sand, is very uniform both laterally and vertically in the Wanipigow Sand Project area.

The authors therefore have a high level of confidence in, and understanding of, the geology and controls of the LBI geo-unit. It is a reasonable estimate by the QP that the tonnage and quality of the LBI can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability of the deposit.

Based on these criteria, the resource estimate for the LBI geo-unit is classified as a Measured Resource. As presented in Figure 14.24, the authors have lowered the confidence level of the LBI resource at the margins of the drillhole density, or when the unit boundary cannot be determined to the same degree as within the measured resource area. Accordingly, portions of LBI have lower classification levels and as such, we have reported the LBI as both a Measured and an Indicated Resource. The distribution of the LBI in the 3-D geological model forms a 'horseshoe' shape as illustrated in Figure 14.24.

Figure 14.24 Plan view of Measured and Indicated Resource classifications applied to the Lower Black Island geo-unit.



APEX Geoscience Ltd.

Upper Black Island – Indicated Resource (with areas of Inferred Resource)

- Based on drill logs and data acquired during CPS's 2018 exploration campaign, the lower boundary between the UBI and the underlying BS is well defined, however, the upper UBI boundary with the Pgf is less certain and may be intercalated.

- The UBI geo-unit is less prevalent in the Wanipigow Sand Project area in comparison to the LBI and occurs in predominantly in the west-central part of the Property.

- The UBI has similar, if not better, Krumbein shape factor and crush resistance test results than the LBI geo-unit and there is no doubt that the two bedrock units formed in similar depositional environments that enabled the silica sand to obtain super-mature status.

Besides the uncertainty in defining the upper contact of the UBI, it is important to point out that this geo-unit has not undergone the same degree of proppant characterization test work as the LBI. At this time, a lesser subset of 57 samples were analyzed for gradation analysis and 8 sample fractions were subjected to crush resistance test work.

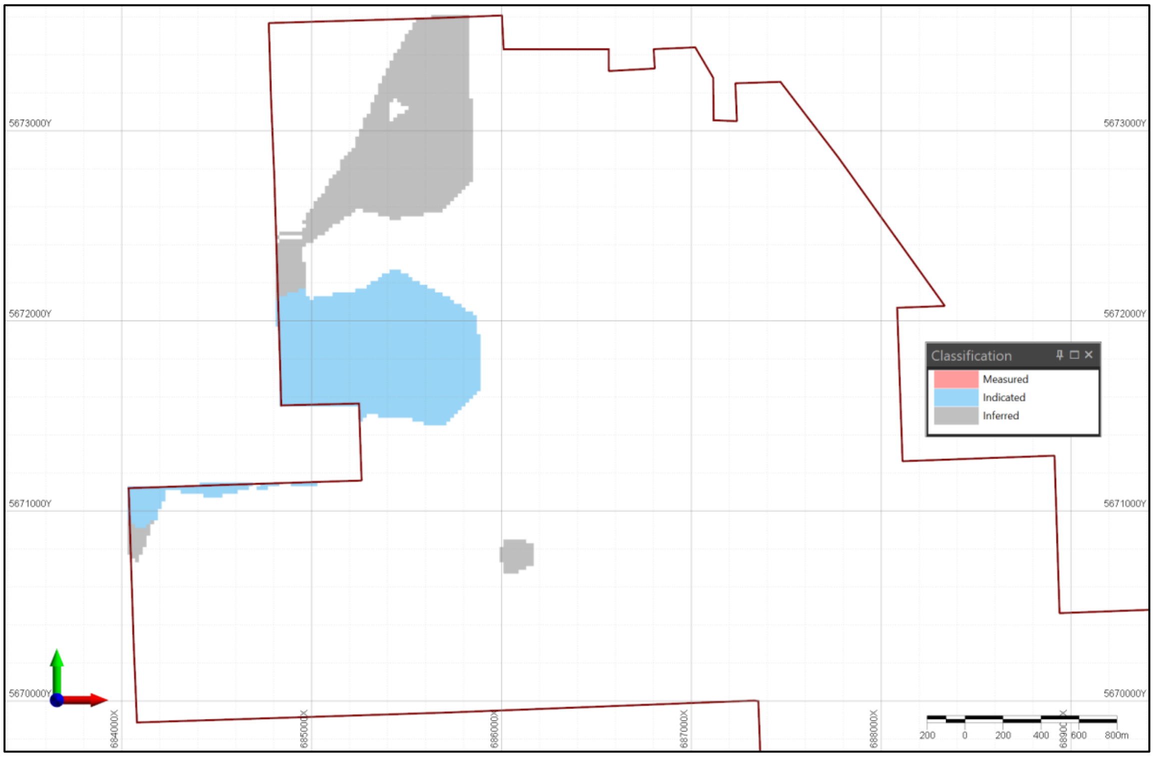
Accordingly, it is the senior authors opinion that the resource classification within the UBI be capped as an Indicated Resource. Like the LBI Measured-Indicated resource, the UBI geo-unit has areas of lower drillhole density, or areas in which the unit boundary cannot be determined to the same degree as within the measured resource area. It is the senior authors opinion, therefore, that these UBI areas of less certainty be classified as an Inferred Mineral Resource. The distribution of Indicated and Inferred UBI resources are presented in Figure 14.25.

An Indicated Mineral Resource estimate is of sufficient quality to support a updated 2020 Preliminary Feasibility Study that can serve as the basis for major development decisions. The authors have no doubt that because the UBI overlies the targeted LBI geo-unit, any future mining decisions will thoroughly evaluate the UBI as part of any production decision. The UBI sand certainly seems to be of high enough quality to run the geo-unit separately, or as part of mixed blend, through any future proppant operational plant.

Pleistocene glaciofluvial (Pgf) – Inferred Resource

The Pgf geo-unit has increased discontinuity with respect to lithological consistency, particle size distributions and proppant characterization test results in comparison to the higher quality and more continuous LBI and UBI units. As a surficial mineral deposit, the material can include a random distribution of glaciofluvial (sand, sand and gravel), glaciolacustrine (sand, siltstone and clay), till (clay with pebbles, cobbles and boulders) and/or organic material. In short, the unit – as presently defined – is somewhat unpredictable.

Figure 14.25 Plan view of Indicated and Inferred Resource classifications applied to the Upper Black Island geo-unit.

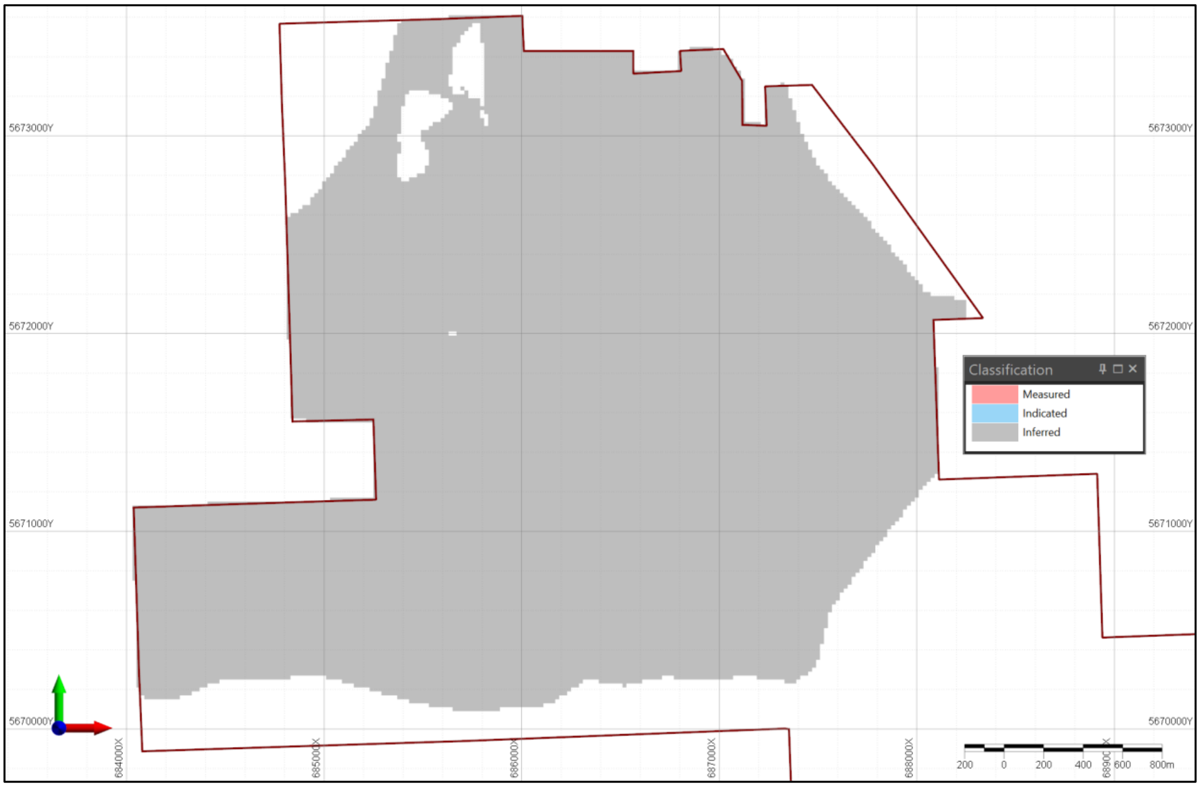


Many Pgf samples were evaluated as part of CPS's 2018 exploration work (n=451 samples). The results show that the Pgf sand does not have the same quality as the LBI/UBI. Krumbein shape factor and crush resistance scores were the lowest of all samples in this dataset. Having said this, the CPS exploration work exhibited areas in which the Pgf unit is characterized by exfoliated and/or reworked UBI bedrock sandstone. This contention is supported by the proppant test work conducted that shows some Pgf sand fractions yield ISO/API proppant results that are equivalent to the LBI/UBI geo-units.

As such, it is possible that the Pgf is not exclusively classified as waste material and that: 1) portions of the Pgf sand have ISO/API test results that assimilate reworked UBI; and/or 2) the Pgf geo-unit could be used for specific fracking applications or upgraded via processing to higher levels of proppant classification. In addition, the Pgf could have potential for other applications such as road building or concrete manufacturing as part of CPS's proposed development process.

Accordingly, the senior author advocates an Inferred Resource classification for the Pgf geo-unit. Further work is required to elevate the resource potential of the Pgf such as increased drillhole density, geophysical surveys, marketing analysis and simulated/actual proppant production testing to increase the confidence in the Pgf and its subsequent resource classification level. The distribution of the Inferred Pgf resource is presented in Figure 14.26.

Figure 14.26 Plan view of Inferred Mineral Resource classification applied to the Pleistocene glaciofluvial geo-unit.



14.7.3 Evaluation of Reasonable Prospects for Economic Extraction

A Mineral Resource is a concentration or occurrence of a material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The phrase 'reasonable prospects for eventual economic extraction' implies a judgment by the QP in respect of the technical and economic factors likely to influence the prospect of economic extraction. In the following text, the QP and senior author of this Technical Report provides rationale for why the Wanipigow Sand Project has demonstrated and defined criteria for reasonable prospects for economic extraction.

- CPS's 2018 drill program drilled a total of 93 drillholes (1,573.7 m) within the resource area that delineated prospective silica sand in two Ordovician Black Island sub-members (LBI and UBI) of the Winnipeg Formation. The deposit is road accessible and is approximately 160 km northeast of the City of Winnipeg, MB.

- Sand from Black Island near the Wanipigow Sand Project has historically been recognized as the Province of Manitoba's best source of silica sand (Watson, 1985). The island, which is adjacent to the Wanipigow Property, has been mined on and off between 1929 and 2003 for silica sand; mainly for glass manufacturing, but some historical production was intended for hydraulic fracking (Purtich et al., 2014). Note: the authors have been unable to verify this information and therefore the information is not necessarily indicative to the mineralization on the Wanipigow Property.

- The proppant test work results presented in this Technical Report show the Wanipigow Sand Project Black Island Member silica sand satisfies the recommendations set forth in International Standards ISO 13503-2:2006/Amd.1:2009E for sieve size fractions, sphericity, roundness, acid solubility and turbidity and crush classification. It is the authors opinion, the LBI and UBI sand resembles a slightly less super-mature Wisconsin Northern White proppant.

- The quality of the LBI and UBI silica sand is consistent laterally and vertically over a drill- and geological model-defined area of 4.93 km^2 and 1.66 km^2, respectively. The thickness of the LBI and UBI geo-units averages 7.9 m and 4.6 m.

- The Pleistocene glaciofluvial sand at the Wanipigow Sand Project encompasses approximately 10.07 km^2, averages 10.7 m in thickness and is of lower quality than the LBI or UBI sand. There are Pgf areas that are composed of reworked UBI sandstone. It is possible, therefore, that portions of the Pgf be used: 1) directly as proppant; 2) for specific fracking applications; or 3) upgraded via processing to higher levels of proppant classification.

With respect to marketing, between mid-2017 and present, the energy industry changed its approach to exploring for, and producing from, hydrocarbon areas. Horizontal drilling (versus conventional vertical drilling) has had a profound impact on the energy industry. Companies can now drill numerous wells in different directions from a single well pad and experience greater wellbore lengths within the pay zone, which has led to the development of massive tight shale gas and oil resources in Canada and the U.S. Consequently, frac sand intensity increased 5% from 3Q 2017 to 3Q 2018 and frac sand demand is expected to grow at 21% CAGR from 2018 to 2021 (Jacob, 2018).

Part of this increase in proppant demand is related to the development of regional 'In-Basin' silica sand deposits that are proximal to the hydrocarbon play. Having been through a severe downturn, and as oil prices continue to bounce back, petro-operators are faced with lower budgets, and are therefore choosing local sources of fine sand to reduce transportation cost and maximize the return on investment (Hutchison, 2018; IHS Markit, 2018; Le Capitain and Carlson, 2018). This has caused some analysts to speculate that future proppant demand and pricing needs to consider localized sand.

This contention has a significantly positive outlook for silica sand discoveries in western Canada because of large-scale development of the WCSB's tight oil/gas shale resources, which despite being in its infancy period, already accounts for 8% of Canada's total oil output (Williams, 2018). Canada's current shale output is approximately 335,000 bpd, but the growth potential is expected to rise to 500,000 bpd, mainly due to increased production in the WCSB's tight, liquids rich Duvernay and Montney formations (Canadian Association of Petroleum Producers, 2018). To put these formations into perspective:

- The Late Devonian Duvernay Formation shale extends under 130,000 km² of west-central Alberta, or 20% of the province. It is anticipated that the Duvernay can produce a total of 542 million m³ (3.4 billion barrels) of marketable crude oil, 2.17 trillion m³ (76.6 trillion cubic feet [Tcf]) of marketable gas, and 995 million m³ (6.3 billion barrels) of marketable natural gas liquid (National Energy Board, 2018).

- The Lower Triassic Montney Formation in west-central Alberta and northeastern British Columbia is aerially extensive, covering approximately 130,000 km². The thick and geographically extensive siltstones of the Montney Formation are expected to contain 12.7 trillion m³ (449 Tcf) of marketable natural gas, 2.3 billion m³ (14.5 billion barrels) of marketable natural gas liquids, and 0.18 billion m³ (1.1 billion barrels) of marketable oil (National Energy Board, 2013).

The Wanipigow Property is situated at the eastern margin of the WCSB and its massive and emerging tight oil and gas shale plays. Accordingly, local sources of silica sand are presently, and should continue to be, in demand as the vast tight oil-gas shale plays develop.

In addition to the WCSB, the Wanipigow Sand Project is directly north of North Dakota, U.S., which has produced approximately 450 million barrels of oil from the Bakken and Three Forks Formations between 2008 and 2013. At present, oil and natural gas production in the Bakken Shale is experiencing record production levels:

- Overall oil production hit a record of 39.3 million bbl (1.269 million b/d) in July 2018.

- Natural gas total July 2018 production was 74.4 Bcf (2.4 Bcf/d), and natural gas continued to outpace oil with a month-over-month increase of 4.3%, compared to 3.5% for oil (Nemec, 2018).

In 2013, the USGS estimated mean undiscovered volumes of 7.4 billion barrels of oil, 6.7 trillion cubic feet of natural gas, and 0.53 billion barrels of natural gas liquids in the Bakken and Three Forks Formations in the Williston Basin Province of Montana, North Dakota, and South Dakota (USGS, 2013). More recently, there were over 15,000 wells producing from the Bakken Shale in December 2018 (Nemec, 2019), and the USGS estimated there may be:

- 11.4 billion barrels of undiscovered, technically recoverable oil in the Bakken Formation (with a mean estimate of 7.4 billion barrels).

- 6.7 trillion cubic feet of associated/dissolved natural gas and 0.53 billion barrels of natural gas (mean values for undiscovered volumes; USGS, 2019).

To conclude, CPS's 2018 exploration program and analytical work has enabled the QP's to develop a high level of confidence in the project via drill and data density, analytical work that relates to the specifications of the product and identification of the market and the factors that influence market demand and the potential for success in the market. Specialized industry standard tests were conducted on silica sand from the Wanipigow Sand Project and the sand meets the ISO 13503-2 quality specifications for proppant product. It is a reasonable estimate by the QP that the tonnage and quality of the Wanipigow sand can be estimated to within close limits and that variation from the estimate would not significantly affect potential viability of the deposit. Lastly, the project is situated in a location such that it can be classified as a regional or In-Basin sand capable of providing proximal silica sand to massive tight oil and gas projects in the Duvernay and Montney fields in the WCSB and Bakken fields in North Dakota, U.S. It is the senior author's opinion, therefore, that the Wanipigow Sand Project sand has reasonable prospect for potential economic extraction.

14.7.4 Cutoff

A lower cutoff of greater than or equal to 20-mesh and less than or equal to 140-mesh fraction is used in the Wanipigow Property Silica Sand Resource Estimate. This cutoff is believed to represent the lowest grade, or quality, of mineralized material that qualifies as being economically mineable.

This cutoff allows the authors to characterize the resources in terms of size fractions that are historically, and currently, in popular demand by the oil and gas industry including: 20/40, 30/50, 40/70, 50/140 and 70/140 mesh sands (Beckwith, 2011; Zdunczyk, 2014; Benson and Wilson, 2015).

14.7.5 Mineral Resources Reporting: Wanipigow Property Silica Sand Resource Estimates

The mineral resource within the Wanipigow Property has been classified as Measured, Indicated and Inferred Resources in accordance with NI 43-101, and has been estimated using the CIM "Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines" dated November 29th, 2019 and the CIM "Definition Standards for Mineral Resources and Mineral Reserves" amended and adopted May 10th, 2014.

The 3-D geological model is defined by 93 vertical drillholes completed by CPS in 2018. The geological model consists of the following stratigraphic units from surface to depth: Pleistocene glaciofluvial (Pgf); Upper Black Island (UBI); Black Shale (BS); and Lower Black Island (LBI). There is unequivocal distinction in all drillholes at the upper LBI contact and the BS shale contact (i.e., grey-white silica sand versus black shale). The lower boundary between the UBI and the underlying BS is well defined, however, the upper UBI boundary with the Pgf is less certain and may be intercalated. In the 3-D geological model, the thickness of the various units is as follows

- Pgf thickness varied from 0.1 to 23.6 m and averaged 10.7 m;

- The thickness of the BS varied from 0.6 m to 3.0 m and averaged 2.0 m.
- UBI thickness varied from 0.2 m to 8.5 m and averaged 4.6 m;
- LBI thickness varied from 0.1 m to 15.9 m and averaged 7.9 m; and

The uppermost topographic surface is defined by 1 m resolution LiDar data. The resource is estimated within a 3-D geological model of the Pgf, UBI, and LBI units.

A total of 744 samples were collected approximately every 5 feet (1.52 m) within the Pgf, UBI, and LBI geo-units (an additional 17 samples of BS were not included in the resource estimation assay file). Grain size particle distribution analyses was conducted throughout intersections with adequate recovery of the Pgf, UBI, and LBI geo-units for all 93 vertical sonic holes drilled by CPS in 2018. This 'assay' file of gradation data was used to calculate the Wanipigow Property Silica Sand Resource Estimate.

The resource is calculated using a block model with a size of 20 by 20 m in the horizontal directions and 2 m in the vertical direction. A block factor (BF) is calculated for each of the units that represents the percentage of the block volume that lies within each unit. The size fractions of interest are estimated at each parent block using ordinary kriging. The mineral resources were estimated using the ordinary kriging technique for the Pgf, UBI, and LBI units. Only those composites located within the Pgf, UBI, and LBI wireframes are used to condition the grade estimate of each block located with that wireframe.

Nominal *in-situ* sand bulk densities of 1.897 g/cm^3, 1.911 g/cm^3, and 1.878 g/cm^3 were applied to Pgf, UBI, and LBI, respectively. The density values are based on 58 representative bulk density samples collected by APEX during the 2018 drill program and include 13 Pgf samples, 3 UBI samples, 6 BS samples, and 36 LBI samples.

The Wanipigow Property estimation of the individual size fractions is completed and reported using a lower cutoff of mesh-sizes that are greater than or equal to 20-mesh and less than or equal to 140-mesh fraction (i.e., the +20 and -140 size fractions are discarded from the estimation process).

Mineral resources are not mineral reserves and do not have demonstrated economic viability. This Wanipigow Property Silica Sand Resource Estimate predicts the following total (i.e., global) resources:

- Lower Black Island Measured & Indicated Resources of 39.2 million tonnes;
- Upper Black Island Indicated Resource of 3.1 million tonnes and Inferred Resource of 1.7 million tonnes; and
- Pleistocene glaciofluvial Inferred Resource of 93.0 million tonnes (Tables 14.10 and 14.11).

Table 14.10 The Wanipigow Silica Sand Measured and Indicated Resource Estimates reported for the UBI and LBI sandstone geo-units as a total (global) volume and tonnage (the total Measured & Indicated resources are presented in the grey highlighted bold text). Selected proppant size fraction distributions of 20/40, 30/50, 40/70, 50/140 and 70/140 mesh are also shown.

		Volume (m^3)			Tonnes (1000 kg)			Tons (907.2 kg)		
Classification	**Size Fraction**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**
Measured	**20/40**	/	/	3,600,000	/	/	6,800,000	/	/	7,500,000
	30/50	/	/	5,600,000	/	/	10,500,000	/	/	11,600,000
	40/70	/	/	7,700,000	/	/	14,500,000	/	/	16,000,000
	50/140	/	/	12,000,000	/	/	22,500,000	/	/	24,900,000
	70/140	/	/	7,500,000	/	/	14,200,000	/	/	15,600,000
Measured Total		/	/	18,900,000	/	/	35,500,000	/	/	39,100,000
Indicated	**20/40**	/	100,000	400,000	/	300,000	700,000	/	300,000	800,000
	30/50	/	300,000	600,000	/	600,000	1,100,000	/	700,000	1,200,000
	40/70	/	700,000	800,000	/	1,300,000	1,500,000	/	1,400,000	1,600,000
	50/140	/	1,200,000	1,200,000	/	2,400,000	2,300,000	/	2,600,000	2,500,000
	70/140	/	800,000	800,000	/	1,500,000	1,400,000	/	1,700,000	1,600,000
Indicated Total		/	1,600,000	1,900,000	/	3,100,000	3,700,000	/	3,400,000	4,000,000
M&I Total		**/**	**1,600,000**	**20,900,000**	**/**	**3,100,000**	**39,200,000**	**/**	**3,400,000**	**43,200,000**

Note 1: Mineral resources are not mineral reserves and do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.

Note 2: The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).

Note 3: Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 100,000 unit).

Note 4: The product size fractions overlap and are not cumulative.

Note 5: The 'Total' (global) volume and weights are estimated on a global basis and represent the main Measured & Indicated LBI and UBI Silica Sand Resource.

Note 6: The Wanipigow estimation of the individual sieve size fractions was completed and reported using a lower cutoff of mesh-sizes that are greater to or equal to 20-mesh and less than or equal to 140-mesh fraction.

Note 7: *In-situ* compacted bulk densities used include: Pgf: 1.90 g/cm^3; UBI: 1.91 g/cm^3; LBI: 1.88 g/cm^3. Bulk densities are utilized to convert volume (cubic metres) to tonnages.

Table 14.11 The Wanipigow Property Silica Sand Inferred Resource Estimates reported for the Pgf and UBI sandstone geo-units as a total (global) volume and tonnage (grey highlighted bold text). Selected proppant size fraction distributions of 20/40, 30/50, 40/70, 50/140 and 70/140 mesh are also shown.

		Volume (m^3)			Tonnes (1000 kg)			Tons (907.2 kg)		
Classification	**Size Fraction**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**	**Pgf**	**UBI**	**LBI**
Inferred	**20/40**	9,800,000	100,000	/	18,700,000	200,000	/	20,600,000	300,000	/
	30/50	12,400,000	200,000	/	23,400,000	400,000	/	25,800,000	400,000	/
	40/70	15,700,000	300,000	/	29,800,000	600,000	/	32,800,000	700,000	/
	50/140	32,300,000	700,000	/	61,300,000	1,300,000	/	67,600,000	1,400,000	/
	70/140	23,500,000	400,000	/	44,600,000	900,000	/	49,200,000	900,000	/
Inferred Total		**49,000,000**	**900,000**	**/**	**93,000,000**	**1,700,000**	**/**	**102,600,000**	**1,900,000**	**/**

Note 1: Mineral resources are not mineral reserves and do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.
Note 2: The weights are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).
Note 3: Numbers may not add up due to rounding of the resource values percentages (rounded to the nearest 100,000 unit).
Note 4: The product size fractions overlap and are not cumulative.
Note 5: The 'Total' (global) volume and weights are estimated on a global basis and represent the main Inferred Pgf and UBI Silica Sand Resource.
Note 6: The Wanipigow estimation of the individual sieve size fractions was completed and reported using a lower cutoff of mesh-sizes that are greater to or equal to 20-mesh and less than or equal to 140-mesh fraction.
Note 7: *In-situ* compacted bulk densities used include: Pgf: 1.90 g/cm^3; UBI: 1.91 g/cm^3; LBI: 1.88 g/cm^3. Bulk densities are utilized to convert volume (cubic metres) to tonnages.

As presented in Section 14.5.2, the authors have lowered the confidence level of the LBI resource at the margins of the drillhole density, or when the unit boundary cannot be determined to the same degree as within the measured resource area (see Figure 14.24). In this case, 41.5 million tonnes are defined as Measured LBI Resource versus 3.7 million tonnes of Indicated LBI Resource (i.e., by adding the 20/40, 40/70 and 70/140 fractions of the measured and indicated resources in Table 14.10; Numbers may not add up due to rounding of the resource values percentages).

The same methodology was used to define UBI Indicated and UBI Inferred resources (see Figure 14.25). In this instance, the authors have less confidence in the northern portion of the UBI such that the proportion of Indicated to Inferred resource is smaller. The UBI Indicated Resource is 3.1 million tonnes versus 1.7 million tonnes of UBI Inferred Resource (see Tables 14.10 and 14.11).

The Pgf is classified as Inferred Resource, and therefore, all tonnage is presented in this category (93.0 million tonnes). The issuer advocates that there is salable product within the Pgf and evaluation of the data presented in this study shows that the Pgf geo-unit has reasonable prospect of economic extraction. Further work is required to elevate the resource potential of the Pgf such as increased drillhole density, geophysical resistivity and/or ground-penetrating radar surveys, marketing analysis and simulated/actual proppant production testing to increase the confidence in the Pgf and its subsequent resource classification level.

With respect to unequivocal waste rock, the black shale geo-unit overlying the LBI resource has an estimated volume of 920,000 m^3 for a total weight of 1.7 million metric tonnes. The density of the BS was taken from loose material bulk density tests on 6 samples that average 1.814 g/cm^3.

Selected size fractions within the main, global Inferred Mineral Resource Estimates are also presented in Tables 14.10 and 14.11. The 50/140 fraction aside (because of the large range of sieve sizes it dominates the fraction comparison), observations of the other sand size fractions include:

- The LBI geo-unit measured and indicated resources are dominated by tonnage within the 40/70 and 70/140 fractions followed by 30/50 and 20/40.

- The UBI geo-unit indicated and inferred resources are dominated by tonnage within the 70/140 and 40/70 fractions followed by 30/50 and 20/40.

- The Pgf geo-unit inferred resources are evenly spaced from highest to lowest: 70/140, 40/70, 30/50 and 20/40.

The breakdown of size fractions shows the LBI dominates the +70-mesh fractions and the 50/140 fraction, in general. The UBI has a relatively minor amount of +70-mesh sand but does have sizable 50/140 and 70/140 fractions.

14.7.6 Sensitivity Analysis

The resource model was iterated and tested at progressively higher block values – comparable to using the SUMIF function – to determine the commensurate tonnages by way of sensitivity analysis. Incrementally higher block values are increased in increments of 5% and applied to the resources in the 20/40, 30/50, 40/70, 40/140, 70/140 and 50/140 size fractions for Pgf, UBI and LBI. The analysis is intended to show how the resource, and its respective size fractions, dissipate at higher simulated block values.

An example on how to read the sensitivity analysis is presented in Table 14.12. In this case, the authors have selected the Pgf 20/40 fraction. At a block SUMIF value of zero, the tonnage is 18.661 million tonnes, which reflects the actual resource value as presented in the main resource table (see Table 14.11). As the block SUMIF value is incrementally increased, the 20/40 fraction has silica sand resources gradually diminish between iteration increments of zero to 34.99%, but the resource becomes completely exhausted at a block value of 35%. That is, the estimated 20/40 fraction value within that block does not exist at the 35% SUMIF value range, and therefore, the block is exhausted of its resource at this stage.

The results of the sensitivity analysis for the individual size fractions of each geo-unit are presented in Tables 14.13 to 14.15. As suspected, the 50/140 fraction has the highest yield at increasing block iteration increments with resources continuing in the Pgf, UBI, and LBI units to final block cutoff values of 60%. The LBI unit has a high volume/tonnage of the 40/70 size fraction in comparison to the other geo-units (Table 14.15). The LBI 40/70 resource is exhausted at a block iteration increment of 50% compared to the LBI 20/40 (exhausted at 30%-35%) and LBI 30/50 (exhausted at 30%-35%) fractions.

Table 14.12. Example sensitivity analysis using the Pgf 20/40 fraction.

Iteration increment (%)	20/40		
	Volume	Tonnes	Tons
0	9,837,286	18,661,332	20,570,598
5	9,404,888	17,841,072	19,666,415
10	5,542,483	10,514,090	11,589,800
15	1,939,640	3,679,497	4,055,951
20	373,220	707,999	780,435
25	69,383	131,620	145,087
30	10,420	19,767	21,789
35	0	0	0
40	0	0	0
45	0	0	0
50	0	0	0

Table 14.13 Sensitivity analysis using incrementally higher block cutoff percentages until the inferred resource runs out within the Pgf geo-unit.

Iteration increment (%)	20/40			30/50			40/70			70/140			50/140			Class
	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	
0	9,837,286	18,661,332	20,570,598	12,360,444	23,447,762	25,846,733	15,695,806	29,774,944	32,821,257	23,515,874	44,609,613	49,173,681	32,312,095	61,296,045	67,567,323	Inferred
5	9,404,888	17,841,072	19,666,415	12,097,935	22,949,783	25,297,806	15,539,997	29,479,375	32,495,448	23,515,667	44,609,221	49,173,249	32,312,095	61,296,045	67,567,323	Inferred
10	5,542,483	10,514,090	11,589,800	9,905,502	18,790,737	20,713,242	14,351,268	27,224,356	30,009,715	23,486,831	44,554,518	49,112,950	32,311,334	61,294,600	67,565,731	Inferred
15	1,939,640	3,679,497	4,055,951	5,059,129	9,597,169	10,579,068	10,928,377	20,731,130	22,852,159	23,063,606	43,751,661	48,227,951	32,269,212	61,214,696	67,477,651	Inferred
20	373,220	707,999	780,435	1,291,649	2,450,258	2,700,947	5,089,132	9,654,084	10,641,806	19,031,542	36,102,835	39,796,563	31,442,659	59,646,725	65,749,259	Inferred
25	69,383	131,620	145,087	183,539	348,173	383,795	1,268,650	2,406,629	2,652,854	9,014,626	17,100,745	18,850,345	28,409,160	53,892,176	59,405,955	Inferred
30	10,420	19,767	21,789	23,973	45,477	50,130	239,800	454,901	501,442	2,233,630	4,237,195	4,670,708	22,069,126	41,865,132	46,148,408	Inferred
35	0	0	0	1,415	2,683	2,958	15,462	29,331	32,332	391,263	742,226	818,164	12,774,575	24,233,370	26,712,717	Inferred
40	0	0	0	0	0	0	0	0	0	60,746	115,235	127,025	4,715,656	8,945,599	9,860,835	Inferred
45	0	0	0	0	0	0	0	0	0	7,722	14,648	16,147	1,135,824	2,154,659	2,375,105	Inferred
50	0	0	0	0	0	0	0	0	0	0	0	0	193,630	367,317	404,897	Inferred
55	0	0	0	0	0	0	0	0	0	0	0	0	30,746	58,324	64,292	Inferred
60	0	0	0	0	0	0	0	0	0	0	0	0	3,412	6,472	7,134	Inferred
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred

Table 14.14 Sensitivity analysis using incrementally higher block cutoff percentages until the indicated and inferred resources run out within the UBI geo-unit.

Iteration increment (%)	20/40			30/50			40/70			70/140			50/140			Class
	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	
0	136,040	259,973	286,572	309,811	592,049	652,622	664,067	1,269,031	1,398,868	799,972	1,528,746	1,685,154	1,246,169	2,381,430	2,625,077	Indicated
5	87,703	167,601	184,749	309,811	592,049	652,622	664,067	1,269,031	1,398,868	799,972	1,528,746	1,685,154	1,246,169	2,381,430	2,625,077	Indicated
10	31,827	60,822	67,044	255,628	488,506	538,485	664,067	1,269,031	1,398,868	799,972	1,528,746	1,685,154	1,246,169	2,381,430	2,625,077	Indicated
15	121	231	254	97,876	187,040	206,177	650,281	1,242,688	1,369,829	799,972	1,528,746	1,685,154	1,246,169	2,381,430	2,625,077	Indicated
20	0	0	0	65,502	125,175	137,982	599,227	1,145,123	1,262,282	799,972	1,528,746	1,685,154	1,246,169	2,381,430	2,625,077	Indicated
25	0	0	0	3,313	6,332	6,979	502,132	959,574	1,057,749	797,512	1,524,046	1,679,973	1,246,169	2,381,430	2,625,077	Indicated
30	0	0	0	0	0	0	285,871	546,299	602,192	559,604	1,069,402	1,178,814	1,246,169	2,381,430	2,625,077	Indicated
35	0	0	0	0	0	0	116,726	223,063	245,885	305,983	584,734	644,559	1,246,169	2,381,430	2,625,077	Indicated
40	0	0	0	0	0	0	0	0	0	33,341	63,715	70,234	1,246,169	2,381,430	2,625,077	Indicated
45	0	0	0	0	0	0	0	0	0	360	689	759	1,185,191	2,264,899	2,496,624	Indicated
50	0	0	0	0	0	0	0	0	0	0	0	0	735,564	1,405,663	1,549,479	Indicated
55	0	0	0	0	0	0	0	0	0	0	0	0	305,520	583,849	643,584	Indicated
60	0	0	0	0	0	0	0	0	0	0	0	0	2,323	4,440	4,894	Indicated
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Indicated
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Indicated
0	122,145	233,419	257,296	185,099	353,723	389,907	322,363	616,036	679,052	447,597	855,357	942,854	655,066	1,251,831	1,379,885	Inferred
5	118,687	226,811	250,012	185,099	353,723	389,907	322,363	616,036	679,052	447,597	855,357	942,854	655,066	1,251,831	1,379,885	Inferred
10	32,105	61,352	67,628	166,117	317,450	349,923	322,363	616,036	679,052	447,597	855,357	942,854	655,066	1,251,831	1,379,885	Inferred
15	1,253	2,394	2,639	27,382	52,328	57,680	320,155	611,816	674,401	447,597	855,357	942,854	655,066	1,251,831	1,379,885	Inferred
20	0	0	0	0	0	0	161,690	308,989	340,596	447,597	855,357	942,854	655,066	1,251,831	1,379,885	Inferred
25	0	0	0	0	0	0	72,069	137,724	151,812	435,577	832,388	917,536	655,066	1,251,831	1,379,885	Inferred
30	0	0	0	0	0	0	0	0	0	149,145	285,017	314,172	655,066	1,251,831	1,379,885	Inferred
35	0	0	0	0	0	0	0	0	0	20,127	38,463	42,397	650,384	1,242,884	1,370,022	Inferred
40	0	0	0	0	0	0	0	0	0	0	0	0	481,750	920,624	1,014,797	Inferred
45	0	0	0	0	0	0	0	0	0	0	0	0	154,751	295,729	325,980	Inferred
50	0	0	0	0	0	0	0	0	0	0	0	0	113,542	216,979	239,175	Inferred
55	0	0	0	0	0	0	0	0	0	0	0	0	31,816	60,799	67,019	Inferred
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Inferred

Table 14.15 Sensitivity analysis using incrementally higher block cutoff percentages until the Measured, Indicated and Measured and Indicated resources run out within the LBI geo-unit.

Iteration increment (%)	20/40			30/50			40/70			70/140			50/140			
	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Volume	Tonnes	Tons	Class
0	3,617,174	6,793,053	7,488,060	5,586,539	10,491,520	11,564,921	7,740,687	14,537,010	16,024,311	7,549,645	14,178,234	15,628,828	12,007,394	22,549,886	24,856,994	Measured
5	3,615,995	6,790,839	7,485,618	5,586,539	10,491,520	11,564,921	7,740,687	14,537,010	16,024,311	7,549,645	14,178,234	15,628,828	12,007,394	22,549,886	24,856,994	Measured
10	3,090,224	5,803,440	6,397,198	5,586,539	10,491,520	11,564,921	7,740,687	14,537,010	16,024,311	7,549,645	14,178,234	15,628,828	12,007,394	22,549,886	24,856,994	Measured
15	2,142,190	4,023,033	4,434,635	5,579,214	10,477,764	11,549,757	7,739,266	14,534,342	16,021,370	7,547,364	14,173,949	15,624,104	12,007,394	22,549,886	24,856,994	Measured
20	794,994	1,492,999	1,645,750	4,194,332	7,876,955	8,682,856	7,711,955	14,483,051	15,964,831	7,304,476	13,717,806	15,121,292	12,007,394	22,549,886	24,856,994	Measured
25	43,967	82,569	91,017	1,242,685	2,333,762	2,572,533	7,017,010	13,177,946	14,526,198	6,394,458	12,008,793	13,237,428	12,003,173	22,541,959	24,848,256	Measured
30	0	0	0	84,435	158,568	174,792	4,293,427	8,063,055	8,887,997	4,734,792	8,891,940	9,801,686	11,867,776	22,287,683	24,567,965	Measured
35	0	0	0	0	0	0	2,027,560	3,807,757	4,197,333	1,639,599	3,079,166	3,394,200	11,297,973	21,217,594	23,388,394	Measured
40	0	0	0	0	0	0	656,589	1,233,075	1,359,232	47,147	88,542	97,601	9,810,941	18,424,947	20,310,027	Measured
45	0	0	0	0	0	0	10,137	19,038	20,985	0	0	0	7,964,803	14,957,901	16,488,263	Measured
50	0	0	0	0	0	0	0	0	0	0	0	0	5,980,885	11,232,103	12,381,274	Measured
55	0	0	0	0	0	0	0	0	0	0	0	0	4,120,126	7,737,596	8,529,240	Measured
60	0	0	0	0	0	0	0	0	0	0	0	0	579,875	1,089,005	1,200,422	Measured
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Measured
0	398,183	747,787	824,294	601,274	1,129,193	1,244,722	794,547	1,492,160	1,644,825	751,779	1,411,841	1,556,288	1,201,508	2,256,433	2,487,291	Indicated
5	398,183	747,787	824,294	601,274	1,129,193	1,244,722	794,547	1,492,160	1,644,825	751,779	1,411,841	1,556,288	1,201,508	2,256,433	2,487,291	Indicated
10	387,094	726,963	801,339	601,274	1,129,193	1,244,722	794,547	1,492,160	1,644,825	751,779	1,411,841	1,556,288	1,201,508	2,256,433	2,487,291	Indicated
15	264,029	495,846	546,577	601,274	1,129,193	1,244,722	794,547	1,492,160	1,644,825	751,779	1,411,841	1,556,288	1,201,508	2,256,433	2,487,291	Indicated
20	83,267	156,375	172,374	555,913	1,044,004	1,150,818	794,547	1,492,160	1,644,825	736,862	1,383,827	1,525,408	1,201,508	2,256,433	2,487,291	Indicated
25	0	0	0	252,094	473,432	521,870	765,637	1,437,867	1,584,977	649,459	1,219,684	1,344,471	1,201,508	2,256,433	2,487,291	Indicated
30	0	0	0	0	0	0	444,901	835,524	921,007	398,366	748,132	824,674	1,199,525	2,252,708	2,483,185	Indicated
35	0	0	0	0	0	0	196,673	369,352	407,141	132,401	248,649	274,089	1,154,322	2,167,816	2,389,608	Indicated
40	0	0	0	0	0	0	4,294	8,065	8,890	0	0	0	1,048,524	1,969,127	2,170,591	Indicated
45	0	0	0	0	0	0	0	0	0	0	0	0	701,780	1,317,942	1,452,782	Indicated
50	0	0	0	0	0	0	0	0	0	0	0	0	548,242	1,029,598	1,134,938	Indicated
55	0	0	0	0	0	0	0	0	0	0	0	0	238,883	448,622	494,521	Indicated
60	0	0	0	0	0	0	0	0	0	0	0	0	128	240	264	Indicated
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Indicated
0	4,015,357	7,540,840	8,312,354	6,187,813	11,620,712	12,809,643	8,535,234	16,029,170	17,669,136	8,301,424	15,590,075	17,185,116	13,208,902	24,806,319	27,344,285	M&I
5	4,014,178	7,538,626	8,309,912	6,187,813	11,620,712	12,809,643	8,535,234	16,029,170	17,669,136	8,301,424	15,590,075	17,185,116	13,208,902	24,806,319	27,344,285	M&I
10	3,477,318	6,530,403	7,198,537	6,187,813	11,620,712	12,809,643	8,535,234	16,029,170	17,669,136	8,301,424	15,590,075	17,185,116	13,208,902	24,806,319	27,344,285	M&I
15	2,406,219	4,518,879	4,981,212	6,180,488	11,606,956	12,794,479	8,533,814	16,026,503	17,666,195	8,299,143	15,585,790	17,180,392	13,208,902	24,806,319	27,344,285	M&I
20	878,261	1,649,374	1,818,124	4,750,244	8,920,959	9,833,674	8,506,502	15,975,211	17,609,656	8,041,338	15,101,633	16,646,701	13,208,902	24,806,319	27,344,285	M&I
25	43,967	82,569	91,017	1,494,779	2,807,194	3,094,402	7,782,648	14,615,813	16,111,175	7,043,917	13,228,477	14,581,899	13,204,682	24,798,392	27,335,548	M&I
30	0	0	0	84,435	158,568	174,792	4,738,328	8,898,579	9,809,005	5,133,159	9,640,072	10,626,361	13,067,301	24,540,390	27,051,150	M&I
35	0	0	0	0	0	0	2,224,233	4,177,109	4,604,475	1,772,000	3,327,815	3,668,288	12,452,295	23,385,410	25,778,002	M&I
40	0	0	0	0	0	0	660,884	1,241,140	1,368,123	47,147	88,542	97,601	10,859,464	20,394,074	22,480,618	M&I
45	0	0	0	0	0	0	10,137	19,038	20,985	0	0	0	8,666,583	16,275,843	17,941,045	M&I
50	0	0	0	0	0	0	0	0	0	0	0	0	6,529,127	12,261,701	13,516,212	M&I
55	0	0	0	0	0	0	0	0	0	0	0	0	4,359,008	8,186,218	9,023,760	M&I
60	0	0	0	0	0	0	0	0	0	0	0	0	580,002	1,089,244	1,200,687	M&I
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	M&I

15 Mineral Reserve Estimates

15.1 Introduction

This section presents the Mineral Reserve estimates for the Wanipigow Silica Sand Project. The QP's for the estimation of the Mineral Reserve was Mr. Robert J. Farmer, P. Eng. and Mr. Michael F Wick PE. Vice President's with BOYD.

The Mineral Reserve estimates reported herein are a reasonable representation of the Mineral Reserves within the Project at the current level of analysis, which is consistent with industry standards for a Preliminary Feasibility Study. The Mineral Reserves were estimated in conformity with generally accepted Canadian Institute of Mining and Metallurgy (CIM) "Estimation of Mineral Resources and Mineral Reserves Best Practices Guidelines" and are reported in accordance with the Canadian Securities Administrators' NI 43-101.

The Mineral Reserve was derived from the Measured and Indicated Mineral Resource estimates presented in Section 14. The Mineral Reserve is the portion of the Mineral Resource that has been identified as being economically extractable and saleable after the application of suitable Modifying Factors and is planned for production. The life-of-mine (LOM) plan that is presented in Section 16 details the production of that Mineral Reserve.

15.2 Definitions

The definition of a Mineral Reserve, as reported in the CIM Definition Standards, is the guiding definition for this section of the report. The following are from those standards:

> *"A **Mineral Reserve** is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Prefeasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified."*

Estimation of Mineral Reserves is reliant on the reasonable and appropriate application of Modifying Factors, which are defined thusly:

> ***"Modifying Factors** are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors."*

A Mineral Reserve, as with a Mineral Resource, is subdivided to indicate the degree of certainty that can be attached to the estimate. For a Mineral Reserve, the following definitions are from the CIM Definition Standards and are applicable to this report:

*“A **Proven Mineral Reserve** is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.”*

*“A **Probable Mineral Reserve** is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.”*

In this study, a Mineral Reserve is defined as the Measured and Indicated Mineral Resource that would be extracted by the mine design and which can then be processed and sold at a profit. The Measured resources meeting that standard are herein classified as Proven mineral reserves, while the Indicated resources meeting that standard are classified as Probable mineral reserves.

15.3 Modifying Factors

The Mineral Resource presented in Section 14 was converted to a Mineral Reserve through the application of appropriate Modifying Factors, as described herein, to potential mining volumes created during the mine design and planning process. Relevant information and BOYD’s knowledge of similar deposits and mining operations form the basis for the Modifying Factors used in the conversion.

To derive the estimate of the saleable product tons, or Mineral Reserves, the following mining and processing recovery factors were applied:

- No external dilution was applied. The relative hardness of the underlying Precambrian basement is unlikely to dilute the material sent for processing. The overlying material is the sand-bearing Pgf – an Inferred Mineral Resource that was treated as separable (i.e. undiluted) waste for mine planning and economic analysis.

- Internal dilution consists of the +20 and -140 size fractions as interpolated in the Mineral Resource block model (refer to Section 14). It is anticipated that nearly all of this material is removed during processing.

- Mining losses of 5% represent Mineral Resources not extracted due to operational constraints typically encountered during routine mining operations. The remaining 95% represents the material that will be extracted and sent for further processing (i.e. plant feed).

- Processing losses of 5% due to general inefficiencies in the processing of silica sand are applied to theoretical product yields as interpolated in the Mineral Resource block model.

Information regarding other relevant Modifying Factors—including infrastructure, economic, marketing, legal, environmental, social and governmental factors—is provided in their respective section of this report.

15.4 Mineral Reserve Statement

Table 15.1 summarizes the estimated Mineral Reserve for the Wanipigow Silica Sand Project, as of 19 March 2020.

The Mineral Reserve identified in Table 15.1 complies with CIM definitions and standards for a NI 43-101 Technical Report. Detailed information on mining, processing, and other relevant factors is contained in the following sections of this report and demonstrate, at the time of this report, that economic extraction is justified.

15.5 Factors That May Affect the Mineral Reserve Estimates

The Mineral Reserves estimated for the Wanipigow Silica Sand Project are subject to the types of risks common to most silica sand quarry operations that exist in Canada. These risks include but are not limited to: site-specific mining and geological conditions, management and personnel capabilities, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, unforeseen changes in legislation and new industry developments.

15.6 Comments on Mineral Reserve Estimates

The Mineral Reserve, which has been estimated using the geological model provided by the resource geologists (see Section 14), has appropriately considered modifying factors, and is supported by a detailed mine plan and cash flow model. The estimation was performed using industry-accepted practices and is reported in accordance with the 2014 CIM Definition Standards.

Given the data available at the time the updated 2020 Preliminary Feasibility Study was prepared, the estimate presented herein is considered reasonable. However, the Mineral Reserve estimate should be accepted with the understanding that additional data and analysis available subsequent to the effective date of the estimate may necessitate revision. These revisions may be material. There is no guarantee that all or any part of the estimated Mineral Resource or Mineral Reserve will be recoverable.

To the extent known to the responsible QP, there are no known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors that could materially affect the Mineral Reserve estimate that are not documented in this Report.

Table 15.1 Wanipigow Mineral Reserve Estimates.

Classification	Size fraction	Tonnes (1000 kg) UBI	Tonnes (1000 kg) LBI	Tonnes (1000 kg) UBI + LBI	Tons (907.2 kg) UBI	Tons (907.2 kg) LBI	Tons (907.2 kg) UBI + LBI
Proven	20/40	/	3,444,000	3,444,000	/	3,796,000	3,796,000
	40/70	/	8,300,000	8,300,000	/	9,149,000	9,149,000
	70/140	/	8,166,000	8,166,000	/	9,001,000	9,001,000
	Proven Total	**/**	**19,910,000**	**19,910,000**	**/**	**21,946,000**	**21,946,000**
Probable	20/40	261,000	282,000	543,000	288,000	311,000	599,000
	40/70	1,173,000	525,000	1,698,000	1,293,000	579,000	1,872,000
	70/140	1,354,000	595,000	1,949,000	1,493,000	656,000	2,149,000
	Probable Total	**2,788,000**	**1,402,000**	**4,190,000**	**3,074,000**	**1,546,000**	**4,620,000**
Proven + Probable		**2,788,000**	**21,312,000**	**24,100,000**	**3,074,000**	**23,492,000**	**26,566,000**

Note 1: The Mineral Reserve is expressed as saleable product tonnages.
Note 2: The Qualified Persons (QP) responsible for the Mineral Reserve estimate is Mr. Robert J. Farmer, P.Eng., and Mr. Michael F Wick PE., Vice President's of John T. Boyd Company
Note 3: The Effective Date of the Mineral Reserve estimates is 19 March 2020.
Note 4: The Mineral Reserve has been estimated in accordance with Canadian Institute of Mining and Metallurgy and Petroleum (CIM) definitions, as required under NI 43-101.
Note 5: The Mineral Reserve is a subset of, not additive to, the Mineral Resource and is quoted on a 100% project basis.
Note 6: The Mineral Reserve may be materially affected by geology, environment, permitting, legal, title, taxation, socio-political, marketing or other relevant issues.
Note 7: Tonnages are reported in metric tonnes (1,000 kg or 2,204.6 lbs) and United States short tons (2,000 lbs or 907.2 kg).

16 Mining Methods

16.1 Overview

The planned Wanipigow Silica Sand Project is projected to include a conventional, open pit quarry employing typical truck-and-excavator mining operations. Hi-Crush Incorporated (HCR) has signed a Letter of Interest to design, construct, commission and manage (if requested) the project. HCR is a leading US public frac sand company with major mining and process facilities in Wisconsin and Texas. Hi-Crush will employ their new (patent pending) mobile plant technology that have much of the modular type plant constructed and tested prior to shipment to the site. CPS may assume sole management and operational duties at some point following commissioning and personnel training but have the flexibility to retain HCR to manage the operations at a cost of US$1.00 per ton sold plus direct expenses.

This mine plan forms the basis of the mine's projected capital and operating cost estimates presented in Section 21, and consequently the economic analysis presented in Section 22. Per the LOM plan, the quarry and wet plant are planned to operate 20 hours per day, 7 days per, 212 days per year (weather permitting) and is expected to extract approximately 1.8 million tonnes of raw sand per year at full production. The dry plant is fully enclosed and will operate continuously in conjunction with the rail loadout.

At this mining rate, the operation will produce an average of 1.3 million product tonnes per year after processing losses. The quarrying and processing operations are planned to be in full production one year after start-up. The mine life is projected to be at least 20 years after which an estimated 9.9 million bank cubic metres (bcm) of waste and 33.9 million tonnes of sand will have been mined.

Development of the quarry is scheduled to begin in 2022. Table 16.1 shows the key results from the LOM plan.

16.2 Mining Methods

The Wanipigow Silica Sand deposit generally exhibits a shallow depth, flat attitude, and consistent thickness. These characteristics favor conventional surface quarrying techniques. Since the target sand horizons do not extend below the water table, the quarry is proposed to be 'dry-mined' using dozer-assisted truck-and-excavator mining methods – methods and technologies that are proven and are prevalent at other silica sand quarrying operations across North America.

As with other surface mining methods, the proposed quarrying operations for the Wanipigow Silica Sand Project involve a series of individual functions. These are described in the following text.

Table 16.1 LOM Plan Key Results.

Description	Units	Value
Surface Area Distrubed	ha	163.1
Waste Material Mined:		
Overburden	Mbcm	9.0
Interburden	Mbcm	0.9
Total	Mbcm	9.9
ROM Sand Mined:	Mt	33.9
Marketable Sand Produced:		
20/40 Mesh	Mt	3.8
40/70 Mesh	Mt	10.1
70/140 Mesh	Mt	10.2
Total	Mt	24.1
Average Product Yield	%	71.1
Strip Ratios:		
Run-of-Mine	bcm/ROM t	0.29
Product	bcm/Product t	0.41

16.2.1 Clearing and Grubbing

Most of the proposed mining area is covered with mixed-wood forest. As a first step in the mining process, trees and undergrowth will be cleared ahead of the active mining area using a medium- or large-sized dozer. Downed trees will be donated to the surrounding communities. Trimmings, shrubs, and ground cover will be pushed ahead of the pit and burned.

16.2.2 Soil Removal and Salvage

The Project area is overlain by a layer of organic material (soils and peat). This layer varies in thickness but is generally thin (less than one meter). The organic material is important for post-mining rehabilitation, so it must be salvaged and stockpiled or alternately salvaged and directly hauled for placement on active reclamation areas. The organic material is to be pushed into piles using a dozer. The piles would subsequently be loaded with an excavator or wheel loader (front-end loader) and hauled to stockpiles or direct placement using articulated haul trucks.

16.2.3 Overburden Removal

The target Black Island sands are overlain by a layer of material generally consisting of interlayered clay with lenses of silica sand and gravel, identified as the Pgf unit in the resource model. As with the overlying organic material, this layer of till has to be removed and may be processed if marketable sand product yields are judged sufficiently high; otherwise, the material is treated as waste and stockpiled for use in reclamation and pit backfilling.

If the Pgf material is determined to contain a sufficient quantity of marketable silica sand, it will be removed using an excavator-and-truck fleet or loader-and-truck fleet. Otherwise, the Pgf material will primarily be dozed into piles, picked up by excavator or loader, and hauled from the quarry by articulated trucks to stockpiles or active reclamation areas. During the initial mining periods, the waste material will be placed in a temporary external waste dump as required. Once sufficient working space is available on the quarry floor, this material is to be directly placed on the pit floor and contoured. As such, a permanent external waste dump was not required for the Project. The waste material is planned to be placed in-pit.

16.2.4 Sand Mining

The raw sand of the LBI and UBI is weakly cemented and can be mined using a hydraulic excavator (with support from a wheel loader and dozer with ripper, as required) to load a fleet of 40–45 tonne articulated dump trucks. No drilling and blasting operations are planned for the quarry.

When the mine has reached a steady-state operation, the trucks will enter the pit via ramp and travel on the bottom of the pit. The excavator will operate from the top of the sand layer or on intermediate benches. Each bench can be either top-loaded (trucks on the same level as the excavator) or bottom-loaded (trucks below the excavator level). If required, the wheel loader will operate from the floor (bottom) of the quarry. The dump trucks will haul the raw sand to a dump hopper feeding the primary crusher located adjacent to the processing facilities.

16.2.5 Inter-Burden Removal

Within the western portions of the Wanipigow Silica Sand deposit, a relatively thin layer of black shale/sandstone separates the LBI and UBI sand-bearing units. As this unit may contain grains of pyritic/marcasite (iron sulfides), a potentially acid-forming material, care must be taken to minimize prolonged exposure of this unit to air and water.

Where present, the black shale/sandstone unit will be removed by dozer or excavator and immediately placed within special “cells” lined with impermeable material such as bentonite clay or synthetic liners. These cells are to be constructed in the bottom of previously mined portions of the quarry and immediately covered with crushed limestone to neutralize acids that are potentially generated. Ultimately the cells would be buried with overburden during the on-going reclamation process.

16.2.6 Reclamation

Following the removal of sand from a mining area, overburden and de-watered waste sand from the wet process plant are placed into the remaining void. Stockpiled soils and peat will then be placed and spread across the graded overburden and waste sand surface. Any residual undergrowth that was initially grubbed will be placed on the reclaimed land surface as appropriate to aid in rehabilitation of the land, and CPS will revegetate with a native seed mixture and tree saplings appropriate for the area as specified in the Manitoba Environment License Closure Plan.

Progressive reclamation and revegetation of the previously mined areas are planned to be carried out concurrently with mining operations; thereby, minimizing the disturbed footprint of the quarry operation.

16.2.7 Mining Support Operations

The main mine support operations include haul road construction and maintenance, equipment fuel and lube service, and equipment maintenance.

Quarry haul roads are to be constructed using crushed rock for both road base and surface gravel. While in use, the roads will be graded as required with a dozer and sprayed for dust suppression.

A fuel truck will periodically service the machines that cannot easily be refueled at a central fuel depot. The refueling and lubing of dozers, excavators, loaders, etc., will occur as required.

Equipment maintenance is planned to be conducted in a maintenance shop or out in the quarry. The maintenance work fleet will include a service truck, skid steer, man lift, telescopic forklift, and pickup trucks.

16.3 Quarry Design Basis

16.3.1 Geotechnical

Slope stability studies have not been conducted for the Project. Assumptions of 50° overall slopes were used for this study and quarry design. Benches within the quarry will be developed to optimize mine production and are anticipated to range from three to five meters in height. These assumptions were based on experience with similar operations across North America, the mining equipment selected, and site observations.

The planned quarry is relatively shallow (14–20 m) and is expected to lie above the water table. As such, variations in achieved wall angles are not anticipated to pose significant effects on the expected mining recovery rates.

16.3.2 Hydrogeology and Hydrology

Hydrology studies are reportedly underway to assess potential water sources – including surface run-off, rainfall, snowmelt, and groundwater – which may affect the quarry operation. At this stage of study and based on results of exploration drilling, it is assumed that there will not be excessive inflow of water into the active mining areas. As such, dewatering before or during mining activities should be manageable with drainage ditches and sumps. On-site water ponds can be used to hold any excessive ground or storm water.

16.3.3 Property Limits

The pit design has been done respecting the Property limits as of 19 March 2020. Casual Quarry permits on designated land survey NE/NW-25-025-008-E1 are surrounded by CPS Quarry leases (1693, 1682, 1680 and1679) and truncate the proposed quarry limits. Acquisition of these leases may be considered to expand the quarry and potentially, increase the Mineral Reserve.

16.4 Mine Planning

The detailed quarry design and production schedule were developed by BOYD and CPS with several goals providing a framework for the LOM plan. The primary mine planning consideration was the safe, economical, and predictable supply of raw sand feed to the wet-processing plant throughout the year. As with most industrial mineral operations, the overall annual mine production correlates with the volume of sales tonnes that are estimated to be economically viable in the market when sold from this location. Some of the other key goals were as follows.

- Prioritized extraction of Mineral Resources exhibiting high crushing strengths (K-values).

- Prioritized extraction of Mineral Resources demonstrating high theoretical processing yields and low mining strip ratios.

- Endeavor to maintain overall mining rates that are reasonably consistent from year to year.

- Minimization of the active mining area footprint through just-in-time overburden removal and progressive reclamation of disturbed areas.

- Minimize early year haulage distances by commencing the mining operation in close proximity to the processing facilities.

As a result of these goals, the proposed quarry design is subdivided by unfavorable geology and adverse mineral ownership into two non-contiguous pits.

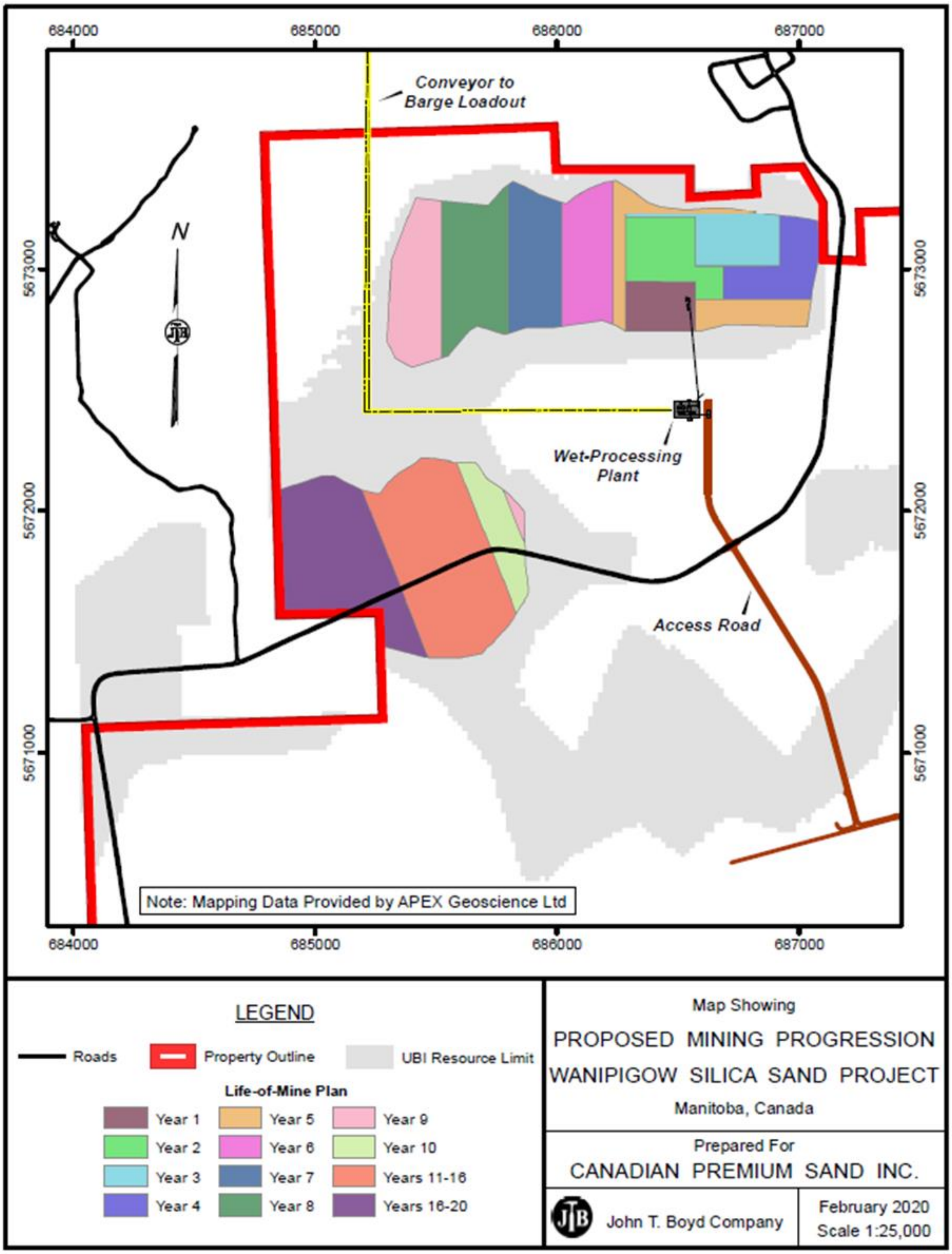
The mine production schedule was established for the first 10 years of mining, then in five-year increments to the end of the mine life. The current proposed mine plan considers a total of approximately 20 years of production at an average annual ROM feed to the wet processing plant of 1.8 million tonnes.

The proposed mine production schedule is summarized in Table 16.2 and Figure 16.1 illustrates the proposed mining progression over the life of the Project.

Table 16.2 Summarized Mine Production Schedule.

Production Quantities	Units	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11-15	Year 16-20	Total
Disturbed Surface Area	Hectares	5.7	9.1	9.2	7.2	10.0	11.6	12.5	15.4	13.7	7.1	31.2	30.4	163.1
Waste Removal:														
Overburden	BCM-000	350.8	720.4	594.4	354.3	671.3	803.7	772.1	942.6	689.4	413.1	1,349.0	1,376.9	9,038.0
Interburden	BCM-000	-	-	-	-	-	-	-	-	4.7	93.5	385.3	398.2	881.7
Total Waste Removal	BCM-000	350.8	720.4	594.4	354.3	671.3	803.7	772.1	942.6	694.1	506.6	1,734.3	1,775.1	9,919.7
Raw Sand		873.3	1,717.5	1,675.3	1,714.4	1,733.8	1,924.7	1,906.1	1,309.1	1,400.9	1,691.5	8,875.0	9,049.5	33,871.1
Saleable Sand														
20/40	Tonnes-000	97.7	188.7	218.3	217.9	210.2	184.1	221.3	200.6	222.5	198.0	959.5	876.9	3,795.7
40/70	Tonnes-000	243.1	507.3	504.7	525.3	504.4	554.5	503.1	343.0	400.3	560.9	2,711.8	2,731.7	10,090.1
70/140	Tonnes-000	276.5	553.6	501.6	515.0	534.9	621.5	581.3	351.1	360.0	479.3	2,650.7	2,770.3	10,195.8
Total Saleable Sand	Tonnes-000	617.3	1,249.6	1,224.6	1,258.1	1,249.6	1,360.1	1,305.7	894.7	982.8	1,238.2	6,322.0	6,378.9	24,081.6
Product Yield														
20/40	%	11.2	11.0	13.0	12.7	12.1	9.6	11.6	15.3	15.9	11.7	10.8	9.7	11.2
40/70	%	27.8	29.5	30.1	30.6	29.1	28.8	26.4	26.2	28.6	33.2	30.6	30.2	29.8
70/140	%	31.7	32.2	29.9	30.0	30.9	32.3	30.5	26.8	25.7	28.3	29.9	30.6	30.1
Total Product Yield	%	70.7	72.8	73.1	73.4	72.1	70.7	68.5	68.3	70.2	73.2	71.2	70.5	71.1
Strip Ratio:														
Waste Volume / Raw Sand Productior	BCM/Tonne	0.40	0.42	0.35	0.21	0.39	0.42	0.41	0.72	0.50	0.30	0.20	0.20	0.29
Waste Volume / Saleable Sand	BCM/Tonne	0.57	0.58	0.49	0.28	0.54	0.59	0.59	1.05	0.71	0.41	0.27	0.28	0.41

Figure 16.1 Proposed Mining Progression: Life-of-Mine Plan. Processing plant locations are subject to change in consideration of licencing approvals.



The proposed major equipment fleet for the Wanipigow Silica Sand Project is shown in Table 16.3. The number of machines remains relatively constant over the mine life after Year 1. In the early years of the operation, there is some spare capacity on most of the machines. This will be useful as equipment operators gain skills and become proficient. In the latter years of the mine life, machines will be required to work within their design capacity to meet the production schedule. The cross-functionality of many machines adds some operational flexibility and should be helpful toward minimizing or alleviating potential problems in the event of capacity shortfalls.

One distinct advantage of the modular wet plant concept is the ability to move the plant (or a portion) toward the working quarry face. This reduces the amount of haulage units required as the haul distance between quarry face and wet plant feed hopper is variable. Auxiliary support equipment requirements are provided in Table 16.4

Table 16.3 Major Equipment Fleet.

Equipment Type	Size	Duties	Units Required
Hydraulic Excavator	Large	Mining, Barge Unloading ,Stripping	2
Articulated Dump Truck	45T	Mining	2
Front-end Loader	Medium	Mining,Stockpile Management,	4
Dozer	Large	Stripping,Reclamation,Grading	2
Dozer	Medium	Stockpile Maintenance, Grading	1

Table 16.4 Auxiliary Equipment Fleet.

Equipment Type	Units Required
Water Truck	1
Service Truck	1
Fuel and Lube Truck	1
Skid Steer	2
Manlift	1
Telescopic Forklift	1
Pickup Trucks	8

16.5 Labour Requirements

The Wanipigow Silica Sand Project labour force is projected to average 103 workers, including 91 hourly workers and 12 salaried staff across the quarry and processing operations. The number of salaried staff remains constant over the mine life while the number of hourly workers will ramp up to 91 employees by the second year. Given the relatively small size of the proposed operation and required labour force, it is assumed that many employees will be cross trained to provide adequate coverage for the various job functions. CPS, in conjunction with HCR, anticipates training additional employees to assure workforce availability and uninterrupted quarry and plant operations. Table 16.5 provides the projected labour requirements for the Project.

Table 16.5 Labour Requirements.

Function	Employees Required
Manager/Accountant	4
Supervisor	8
Quality Control	12
Office	4
Wet Plant Operator	12
Dry Plant Operator	8
Labor/Utility	8
Maintenance	8
Dozer Operator	8
Loader Operator	14
Dump Truck Driver	8
Excavator Operator	8
Grader/Water Truck	1
TOTAL	103

16.6 Comments on the Mining Methods Section

In commercial mining terms, the planned quantities of overburden waste and sand to be mined each year the Wanipigow Silica Sand Project are considered modest. It is BOYD's opinion that the mining methods and performance levels incorporated in the mining plan are reasonable, appropriate, and should be achievable under anticipated operating conditions. As such, the mine design and production plan are adequate for this report.

17 Recovery Methods

17.1 General

The proposed Wanipigow Silica Sand Project is anticipated to include an, on-site wet processing plant with an overland conveyor to barge loading facility, a work-in-process (WIP) sand storage and barge loading facility, a dry processing plant, and finished product storage with rail/truck loadout facilities. Flowsheets, equipment listings, operating parameters, and projected production volumes for the planned processing facilities were provided by CPS and Hi-Crush Incorporated (HCR). HCR have designed, built, and operated proppant sand plants throughout the United States.

In the previous report (Eccles et al., 2019), sand was mined and processed at the mine site and finished product was trucked approximately 160 km to a rail transload near Winnipeg. The updated plan eliminates truck transport and consists of the following:

1. Sand will be excavated and wet processed at the mine site. The saleable 20/140 mesh WIP sand will be processed and then conveyed approximately 1.9 km north of the wet process plant to a barge loadout at the site of a previous ferry dock.

2. The sand will be barged on Lake Winnipeg by a third-party company southward approximately 92 km to an unloading dock to be constructed on a site in the Rural Municipality of St. Andrews.

3. The WIP sand will be stockpiled at this site during the 190-day navigational season and utilized the entire year for feedstock in the dry plant at this site.

4. The dry process plant and rail loadout facilities will be constructed at the site near the Rural Municipality of St. Andrews.

5. The approximately 60-acre site near the Rural Municipality of St. Andrews is serviced by Lake Line Railroad, Incorporated. This short line railroad connects with the CP railroad in Winnipeg.

It should be noted that the desired parcel of land near the Rural Municipality of St. Andrews is in preliminary stages of being secured (leased/purchased) and that a definitive agreement has not been completed. If an agreement is not secured on this parcel, there are several additional options in the area with similar logistics.

The overall process system general design criteria were developed by HCR and CPS to support year-round production from quarried raw sand of the following potential product sizes:

- 20/40 mesh;
- 40/70 mesh; and
- 70/140 mesh.

The proposed processing plant is based on an annual capacity of 2.2 million tonnes of raw sand throughput with an operating availability 75% for the wet-processing plant and 80% for the dry-processing plant. Per the LOM plan, the processing facilities are expected to produce an average of 1.3 million product tonnes per year after processing losses.

BOYD has reviewed the provided engineering documents. We opine that the proposed processing facilities, which are based on conventional methods and technology, are appropriate and suitable for the forecasted production volumes and product specifications under anticipated operating conditions.

The proposed recovery methods and predicted product recoveries form the basis of the processing capital and operating cost estimates presented in Section 21, and consequently the economic analysis presented in Section 22.

Construction of the modular type processing facilities is slated to begin in 2022.

17.2 Process Flow Sheet

Planned processing operations will wash, dry, and sort/size the quarried raw sand to yield a product that is of sufficient quality for sale.

The flowsheet incorporates the following major process operations:

1. The mining feed system performs first pass sizing and screening to provide material for the wet-processing plant.

2. The wet-processing plant sorts the raw sand by size, shape, and density – thereby removing contaminants and a majority of the under- and over-sized materials. The sand is also washed and polished during this stage of processing. The wet-processing plant will produce a 20/140 sized work-in-process (WIP) material which is fed into the dry-processing plant.

3. The dry-processing plant dries and further sorts the WIP material into 20/40, 40/70, and 100 Mesh (70/140 mesh) sized products.

4. The bulk product storage silos and rail-loading facilities stockpile the finished sand products until they can be loaded onto railcars for shipment.

Quality control measures, including laboratory sampling, will be in place at various stages throughout the wet- and dry-processing operations.

Figure 17.1 illustrates the planned site layout of the processing facilities and the text that follows further describes each of these processes.

Figure 17.1 Proposed Processing Facilities. Processing plant locations are subject to change in consideration of licencing approvals and property control (dry process/loadout site).

17.2.1 Mining Feed and Wet Processing System

The mining feed system serves as the raw materials reception/storage and the first pass at sizing and screening. It will be located near the receiving end of the wet-processing plant, as shown in Figure 17.1.

Two- wheel loaders provide feed to the system from a stockpile of quarried raw sand. A light-duty tracked dozer is then utilized to maintain the stockpile. The loader feeds raw sand onto a vibrating grizzly feeder which meters sand onto a scalping screen to remove oversize and then into a classifier/cyclone system. The oversize gravels will be stockpiled and the wastewater from the cyclones will be routed into a clarifier.

The clarifier may use polymer flocculants to aid in fines settling. Overflow from the clarifier will flow into settling ponds. A majority of the water will be recycled in the process with make-up water added from wells drilled on-site. Approximately 4,500 lpm to 6,800 lpm of water are required for the plant. No water will be discharged from the sand processing system. The entire system is of modular design by HCR.

The mining feed system has a nameplate capacity of 520 tonnes per hour (tph) and consist of four modular plants working in parallel. The plant is scheduled to operate 7 days per week, 20 hours per day, 212 days per year depending on weather conditions.

17.2.2 Barge Loadout

The WIP sand will be conveyed directly from the wet process plant to a staging stockpile near the previous Seymourville ferry landing approximately 1.9 km north of the wet process plant. The sand will be stockpiled before loading into a feed hopper to convey material into the barge. A front- end loader will be utilized to load the barge loading conveyor. The lake barge payload is estimated at 4,700 tonnes and the pusher rated at 2,000 horsepower. Mckeil Marine Limited will own and operate the barge and pusher on a per tonne freight basis. The system is projected to move approximately 1.3M tonnes within the 190- day navigational window.

17.2.3 Dry-Processing Plant

The WIP sand will be received and unloaded at a dock approximately 90 km south of the mine site at one of several potential sites located in Rural Municipality of St. Andrews. This dock is not existing and will be constructed as part of the project.

A clamshell type excavator will unload the barge and the WIP sand will be conveyed into a stockpile near the dry process plant. A front-end loader will move the sand from the stockpile to the feed bins at the dry process plant.

Two modular drying and screening plants are planned for this site. The sand will be conveyed into natural gas fired rotary dryers. From the dryer, the sand will then be conveyed to the enclosed product sizing screens which will separate the sand based on particle size. Impurities will be captured via a magnetic separator. The screened sand will then be conveyed to product storage silos prior to being loaded into railcars.

The dry plant components, including all conveyors and transfer points, will be enclosed and under negative pressure to allow fines to be collected in a bag house fabric filter dust collection system. The two modular dry plants will operate in parallel and are expected to be operated year-round and have a combined nameplate capacity of 227 tph.

17.2.4 Bulk Product Storage and Truck-Loading Facilities

Four storage silos (capacity: 3,000 tonnes each) for dry silica sand are to be located adjacent to the dry-processing plant and connected to the central dust collection system. Particle size range of the dry silica sand product will be 20/140 mesh. There will be a covered conveyor and enclosed bucket elevator from the dry plant to transport the silica sand to the silos.

Silica sand will be loaded from the storage silos into railcars within an enclosed and vented silo loading area. Sand will drop by gravity from storage silos into the railcars. There will also be an enclosed bulk tanker truck loading area for over-the-highway trucks. All loading areas will incorporate an enclosed negative-pressure system that is connected to a dust collection system. Sand truck transport loads will be contained with a waterproof sealed load cover.

No exposure of sand to the ambient atmosphere is expected to occur while processing because all sand transfer points are to be fully enclosed.

The final product (silica sand) will be transported by Lake Line Railroad, Incorporated to Class 1 railroad hubs in Winnipeg. The CP and CN railways will deliver sand to the Western Canada energy basins and Bakken play. The loadout will operate 24 hours per day, 7 days per week.

17.3 Predicted Plant Throughput and Product Recoveries

Table 16.2 (Section 16 – Mining) provides a summary of the proposed mine and processing plant production schedule. Table 17.1 provided annual operating statistics for the plant over the LOM.

17.4 Labour Requirements

Table 16.5 provides the projected labour requirements for the Project, including those of those employed in the operation the processing facilities.

Table 17.1 Plant Annual Operating Statistics.

Description	Units	Average	Range
Raw Sand Feed	Mt	1.74	1.31 – 1.92
Product Output:			
20/40 Mesh	Mt	0.19	0.18 – 0.22
40/70 Mesh	Mt	0.52	0.40 – 0.55
70/140 Mesh	Mt	0.52	0.36 – 0.62
Total	Mt	1.23	0.94 – 1.39
Product Recovery:			
20/40 Mesh	%	11.2	9.6 – 15.9
40/70 Mesh	%	27.8	26.2 – 33.2
70/140 Mesh	%	31.7	25.7 – 32.3
Total	%	70.7	61.5 – 81.4

18 Project Infrastructure

18.1 Overview

The proposed Wanipigow Silica Sand Project is a greenfield project with no appreciable existing infrastructure at the mine site. Planned infrastructure includes the following points, for which Capital expenditures are included in Sections 21 and 22:

- Silica sand processing facilities, including wet- and dry-processing plants, product storage silos, and rail-loading facilities;
- Maintenance shop;
- Operations and administration building;
- Fuel depot; and
- Powerline (6 km long) adjacent to the main access road.

18.2 Water Supply

Water for the processing of silica sand is to be sustainably sourced from a combination of groundwater wells, water from seepage within the annual open quarry pit, and supplemental water (as required) to be trucked to the Project site from a licenced source. If required, two 3 m tall x 30.5 m diameter water storage tanks will be installed on-site to provide supplementary water for plant processes. Functioning of the contemplated wet-processing plant requires approximately 4,500 lpm to 6,800 lpm of water. The process water will be recycled within the wet-processing plant, with the addition of 'make-up' water required at a maximum rate of approximately 650 lpm to account for water loss primarily due to evaporation.

18.3 Energy Supply

The wet process facility and mine site is to be supplied via a powerline that is currently proposed to run along a cleared access road right-of-way. Operation of the sand wet plant requires 1,000 kW of power. Operation of the dry plant requires 1,000 kW of power. An additional 2,000 kW of power is allotted for conveyors and other miscellaneous equipment. There will be two diesel generators at the Project site during construction for back-up power during the operational phase in the event of a main power loss. The dry process site and rail loadout facility have adequate existing power along Churchill Road.

Line natural gas, used to fuel the sand dryer(s), is located near the dry process plant site.

18.4 Comments on Infrastructure

In the opinion of the QP, the proposed infrastructure is appropriate to support the current life-of-mine plan.

19 Market Studies and Contracts

19.1 Market Studies

CPS intends to mine sand near the southeastern side of Lake Winnipeg in the province of Manitoba, Canada to be used primarily as a proppant during the process of hydraulic fracturing. Hydraulic fracturing is a method for extracting oil and gas from underground tight shale formations by employing high-pressure drilling to open cracks and liberating trapped hydrocarbons. The sand is used to prop open the underground cracks while allowing the gas and fluids to flow.

CPS' target end markets are principally in the Western Canada Sedimentary Basin (WCBSB) and the Williston Basin. More specifically, and from shortest to longest distance from the mine, the company is focused on the Bakken play in North Dakota and Saskatchewan, the Viking Shaunavon play in Saskatchewan, the Duvernay in Alberta, and the Montney that spans the provinces of Alberta and British Columbia.

Total proppant demand by play was based upon AccuMap IHS Markit data and driven by estimated number of wells and proppant usage intensity per well. In addition, we estimate that over 60% of the annual frac sand consumed in the WCSB is imported. Total demand in 2018 across the 6 plays in the WCSB and the Williston Basin in the United States was estimated to be between 11.0 and 12.0 million tonnes.

Figure 19.1 illustrates the percentage of demand by play. This serves as a basis for the future projections of frac sand demand in the various plays. From this foundation, future frac sand demand is based on drilling activity, commodity price forecasts, rig counts, wells drilled, and regional parameters such as proppant intensity, average total vertical depth and average treatment pressure. In addition, lateral lengths and proppant per stage are taken into consideration to develop a total demand picture for frac sand.

Drilling activity is a function of future commodity prices. Crude oil and natural gas price forecasts from Deloitte and Sproule, as of 31 December 2019, are presented in Figure 19.2 and 19.3. Consequently, commodity prices forecasts were used to develop reasonable drilling forecasts by basin and play. The commodity price forecasts from Deloitte and Sproule were used and included the following products and locations. If price forecasts were provided by Deloitte and Sproule for the same location and commodity, we averaged the price for that given year. Price forecasts provided in U.S. dollars were converted at an exchange rate of 0.75 USD to 1.00 CAD.

Figure 19.1 Total proppant demand by oil and gas play.

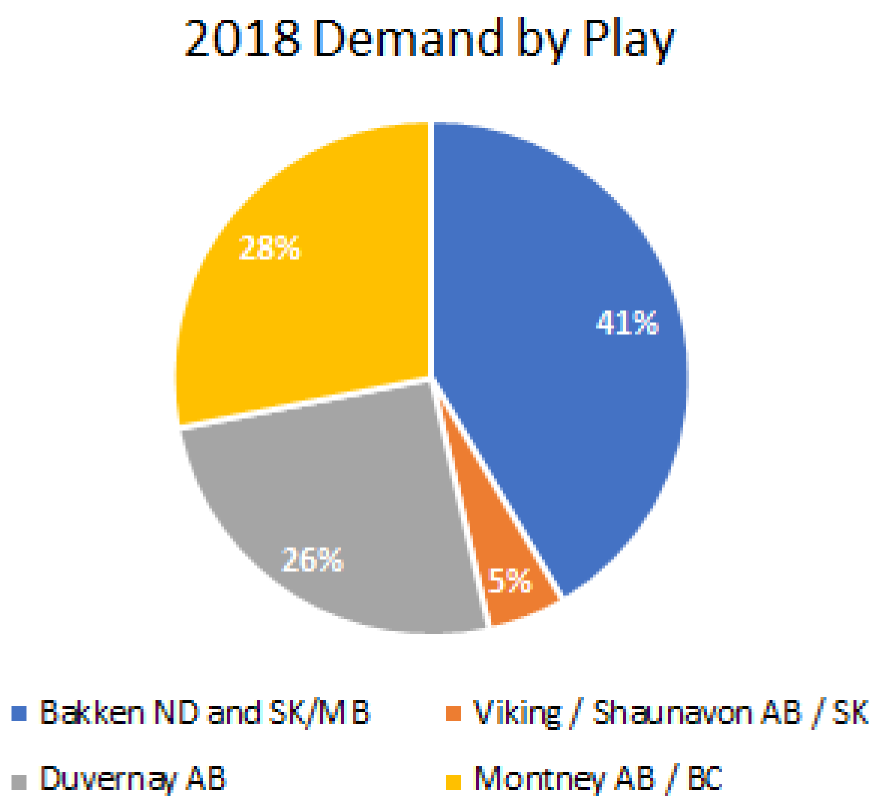


Figure 19.2 Crude Oil: West Texas Intermediate Crude Oil, Canadian Light Sweet and Light Crude at the Edmonton City Gate. Oil price curves as of 31 December 2019 (and include inflation).

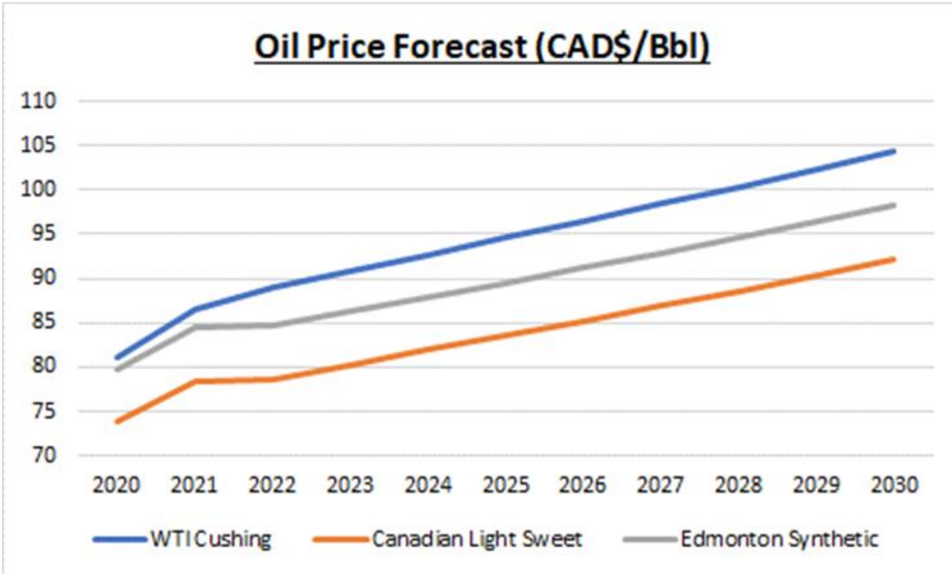
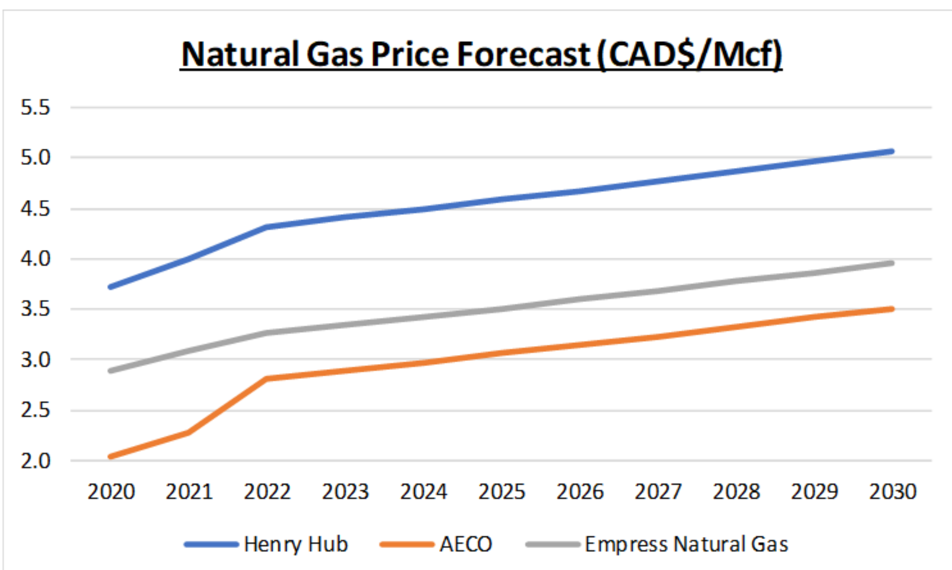


Figure 19.3 Natural Gas: Henry Hub, AECO, and Empress. Natural gas price curves as of 31 December 2019 (and include inflation).



In addition to crude oil and natural gas, price forecasts of Propane, Ethane, Butane, Pentanes and Condensates in Edmonton were incorporated into the basis for future drilling activity and ultimately frac sand forecasts. Commodity price curves from Sproule and Deloitte as of 31 December 2019 (and include inflation).

Within the 6 plays, a more focused target market was developed to sell three different product sizes: 20/40, 40/70 and 70/140. Those sizes have two numbers that correspond to the number of openings per linear inch of the filter screen at the plant. The first number, or the lower number, correspond to the coarser material, while the higher number corresponds to the finer material. The total 2018 estimated total proppant demand for the target markets is approximately 9.5 million tons. Within those target markets, and in order of target market size, the Bakken (U.S. and Canada) accounts for approximately 50%, Duvernay is 26%, Montney is 18% and the Viking/Shaunavon is 6%.

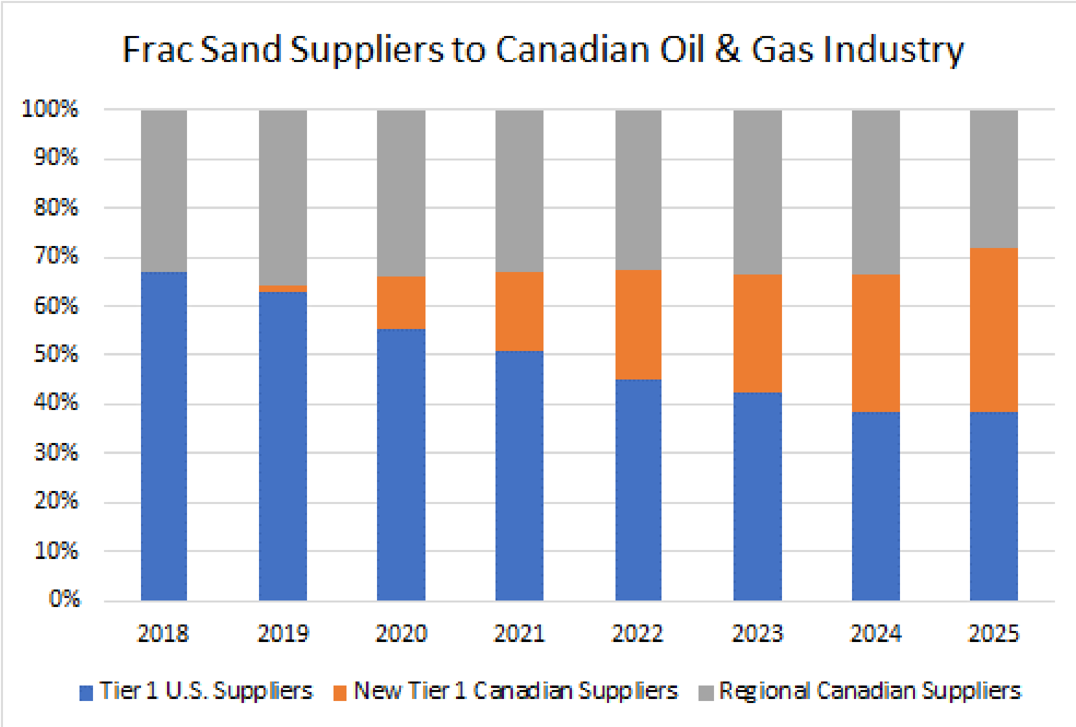
Currently, the Canada frac sand market (WCSB excluding North Dakota Bakken) is supplied by four domestic producers and five to six primary producers based in the United States. The U.S. frac sand that is imported is supplied by Wisconsin mines that produce Tier 1 Northern White Sand (NWS). In 2008, those U.S. mines accounted for approximately 70% of the frac sand consumed in Canada. The imported sand is transported by rail on the Canadian National Railway (CN) to the various plays in the WCSB. The remaining 30% is mined domestically by regional suppliers, primarily located in the provinces of Alberta and Saskatchewan. The current Canadian regionally produced frac sand is of lesser quality based on American Petroleum Institute (API) specifications, particularly the crush strength specifications.

Between 2019-2022, the expectations are that two or three new Canadian suppliers plan to enter the market, including CPS. These new mines would have a transportation advantage over the U.S. based mines in Wisconsin, and a quality advantage over the regional Canadian based mines. In comparison with the Wisconsin mines, the CPS mine is roughly half the distance by rail to the Bakken play in North Dakota and Saskatchewan/Manitoba, as well as the Viking and Shaunavon plays in Alberta/Saskatchewan. CPS' rail distance to the Duvernay and Montney plays in Alberta/British Columbia are approximately 30% shorter.

Additionally, the WCSB market is expected to grow at a compounded annual growth rate of approximately 8% between 2018 and 2025. As the Canadian frac sand market expands, and higher quality Canadian sand mines (such as CPS) enter the market, it is reasonable to expect their market share to grow from virtually zero tons sold in 2019 to between 3.0 and 5.0 million metric tonnes by 2025.

Figure 19.4 illustrates the projected penetration of the new Tier 1 Canadian frac sand suppliers into the WCSB. We estimate that by 2025, the Tier 1 Canadian frac sand suppliers will account for approximately 35% of the frac sand consumption in the WCSB.

Figure 19.4 Projected penetration of the new Tier 1 Canadian frac sand suppliers into the WCSB



19.2 Contracts

CPS currently has no contracts with customers to supply proppant. For a start-up operation such as this, buyers of the sand typically will not sign a formal contract to purchase sand until there is installed capacity in-place or if the supplier's physical assets are nearing completion.

CPS is ratifying agreements with contractors to build the wet and dry plants and transport the sand to the Rural Municipality of St. Andrews. Per a proposal from McKeil Marine Limited, we expect CPS to pay CDN$11.30 per tonne to barge from their mining operation to a rail loadout in Rural Municipality of St. Andrews.

We expect the total capital expenditures for the wet and dry plant, loadout and related infrastructure, including contingencies, to be between CDN$120 and CDN$135 million in year 1. That investment includes equipment, structures, conveyors, buildings, piping, concrete, labor, freight, electrical, roads, infrastructure, temporary housing, transload facilities and storage.

20 Environmental Studies, Permitting and Social or Community Impact

20.1 Environmental Licence Act Introduction

All components of the Project have been assessed and permitted as one 'Class 2 development' under *The Environment Act* (C.C.S.M. c. E125) of Manitoba. The Class 2 development designation is primarily triggered by the development of the new two-lane all-season main access road for the 2019 Project Plan which was considered Class 2 development under the Classes of Development Regulation. Therefore, the Environmental Approvals Branch of Manitoba Sustainable Development reviewed the entire project under the higher and more restrictive Class 2 development category.

With the issuance of Environment Act Licence No. 3285 (EA Licence) to CPS, for the Project, CPS will proceed with approval applications required for other specific Project-related activities. In this section, the authors discuss select terms and conditions associated with the EA Licence, which can be viewed in its entirety at: https://www.gov.mb.ca/sd/eal/registries/5991wanipigow/index.html. Selected excerpts of the EA Licence include:

- CPS (the Licencee) shall obtain all necessary federal, provincial and/or municipal licences, authorizations, permits and/or approvals for construction and operation of the Development.

- The Licencee shall comply with the provisions of Manitoba Regulation 83/2003 respecting Onsite Wastewater Management Systems Regulation.

- The Licencee shall comply with the requirements of *The Heritage Resources Act* and a heritage resource protection plan will be developed for lifetime of the project.

- The Licencee shall prepare, prior to commencing construction of the Development, a remediation and closure plan assessment, along with posting a permit bond.

- The Licencee shall, prior to construction of the Development shall prepare comprehensive environmental management plans (e.g., Erosion and Sediment Control Plan; Surface Water Management Plan; Heritage Resources Management Plan; and Emergency Response Plan).

- The Licencee shall, prior to operation of the Development shall prepare comprehensive environmental management plans (e.g., Dust Management Plan; Air Quality Monitoring Plan; Progressive Rehabilitation Plan; Wildlife Monitoring Plan; Groundwater Monitoring Plan; and Revegetation Monitoring Plan).

- Licencee shall prepare and maintain a progressive rehabilitation plan.

- The Licencee shall, 60 days prior to commencing mining of an open pit mining area, submit an Annual Operating Plan for the clearing, construction, mining, monitoring and rehabilitation activities for the upcoming two-year period.

- The Licencee shall begin restoration and rehabilitation of the current open pit mining area prior to commencement of mining at a new mining area.

- The Licencee shall treat all black shale brought to the surface at the Development as potentially acid-generating material.

- The Licencee shall limit the number of silica sand hauling trucks leaving the Development to a maximum of four (4) trucks per hour.

Under issuance of the Environmental Act Licence approval, CPS was in a position to proceed with designing the required plans. The Company did not proceed with the detailed design while it undertook a review of the Project. That Project review resulted in a number of modifications to the plant design and Project logistics expanded elsewhere in this document. A summary of the permitting and mitigation procedures conducted to date by CPS is provided in the text that follows. It should be noted that some of this work will need to be updated and some completed in light of the changes to the approach to the Project. CPS has engaged a consulting firm to assist in identifying outstanding permitting requirements and expects to have this process completed in 2020. A summary of the permitting and mitigation procedures conducted to date by CPS is provided in the text that follows.

20.2 Permitting

Exploratory, geotechnical and hydrogeologic drilling activities, including clearing for temporary access trails, were completed by CPS within Quarry Lease areas issued to CPS under provisions of *The Mines and Mineral Act* (C.C.S.M. c. M162), and under work permits in in accordance with *The Crown Lands Act* (C.C.S.M. c. C340) and applicable regulations.

As necessary, general work permits for clearing of trees and land use (laydown areas, construction of access roads and facilities construction) will be sought in accordance with *The Crown Lands Act* (C.C.S.M. c C340) and applicable regulations. Burning permits to dispose of woody debris will be sought, as required, in accordance with Section 19(1) of *The Wildfires Act* (C.C.S.M. c W128). CPS will adhere to the specific terms and conditions of the approved Environmental Act Licence (approved on May 16, 2019; Canadian Premium Sand Inc., 2019).

CPS will apply for water rights license(s) for use of groundwater needed to support the sand wash plant and associated facilities. A hydrogeological study and pump tests for groundwater conditions at the Project site are currently underway and demonstrate the feasibility and sustainability of groundwater use for Project operations (See Section 16).

CPS has finalized agreements with Manitoba Hydro to coordinate development of the powerline, including powerline capacity, required for the Project. CPS will also coordinate with Manitoba Infrastructure regarding approvals for the development of Project access road intersections with provincial roads and any required improvements needed to local roads that will be required for truck transport of the sand.

No federal permits or approvals are expected to be required for the Project; Canada has informed CPS that the Project has not been designated for federal environmental oversight, under the *Canadian Environmental Assessment Act, 2012*.

As the Project substantially falls within the jurisdictional boundaries of The Incorporated Community of Seymourville, the Company was required to submit an application to the Incorporated Community of Seymourville, to utilize lands that are zoned "natural areas", under applicable Zoning and Development Plan By-laws, for the purpose of harvesting silica sand and other ancillary commercial purposes. The Company made the required Conditional Use Application, and a hearing on its application was held on May 3, 2019.

On May 9, 2019, the Incorporated Community of Seymourville issued a Conditional Use Order to the Company, approving the conditional use of lands within its jurisdictional boundaries for a silica sand extraction operation, including accessory uses, building and structures. The Conditional Use Order applies to the Project through all phases of its lifecycle.

20.3 Baseline Environmental Studies

Baseline environmental information to support the environmental review and permitting process for the Project was based on existing desktop information in addition to Project site-specific studies. Site-specific studies focused on obtaining information on potentially environmentally sensitive habitats, resource use and existence of rare or protected wildlife and plant species through a Traditional Ecological Knowledge (TEK) study and conducting geotechnical and hydrogeotechnical studies to characterize the geological strata and groundwater resource.

Baseline environmental information, including results of the TEK study, was provided within the Environment Act Proposal (EAP) submitted to Manitoba Sustainable Development on December 18, 2018 as part of the provincial environmental review process for an Environment Act Licence application.

The EAP is available in the Manitoba Sustainable Development at: https://www.gov.mb.ca/sd/eal/registries/5991wanipigow/index.html.

Within the EAP, baseline environmental information is provided for geology/topography, soils, groundwater, surface water and drainage, vegetation, wildlife, species of conservation concern, air quality, noise and vibration and the socioeconomic environment including heritage resources.

The existing land cover at the proposed Project site is primarily mixed-wood boreal forest with some human disturbance in the form of existing roads, trails, exploratory drilling activities and previous small quarry and tree cutting operations. Based largely on local community consultation, the final project design assures that no Project components or activities occur in or immediately adjacent to fish-bearing waterbodies and no Project effects to fish-bearing waterbodies, including Lake Winnipeg, are anticipated. The natural land cover that will be cleared for the Project is common to the regional area. Baseline environmental information, including TEK, did not identify sensitive environmental components that could not be sufficiently protected through proposed mitigation and monitoring.

20.4 Environmental Considerations

20.4.1 Environmental Protection Measures

The EAP for the Project outlines the potential adverse effects of the proposed Project and mitigation measures that will be applied to avoid or minimize adverse environmental effects. Project environmental protection measures will be provided within an Environmental Management Program (EMP) document which is a condition/requirement within the EA Licence for the Project. The EMP for the Project is a 'living document' that will be periodically updated as needed, and includes a series of environmental protection plans that will include but not necessarily be limited to the following plans that will apply to the construction and operation phases of the Project:

- Erosion and Sediment Control Plan
- Dust Management Plan
- Surface Water Management Plan
- Heritage Resources Management Plan
- Emergency Response Plan
- Closure Plan

Additionally, the EMP outlines monitoring plans for aspects of Project effects to the environment that require study once the Project is operating. A Revegetation Monitoring Plan will be implemented to determine if the progressive annual quarry rehabilitation process is proceeding at a required rate of success as determined by regulators and the Project Operational Oversight Committee.

A Closure Plan for the Project discussed in Section 20.5 also includes requirements for revegetation monitoring during the closure phase of the Project. Monitoring plans for groundwater and air quality will also be implemented during Project operation as indicted in Sections 20.3.2 and 20.3.4 below.

With the implementation of environmental protection measures, including the above-listed environmental management plans and monitoring plans, the risks of significant Project-related adverse effects to the environment are negligible.

20.4.2 Water Management

The overall Project water management strategy includes recycling the wet plant process water in a closed-loop system. No process water will be discharged. Water for the processing of silica sand will be sustainably sourced from a combination of groundwater, water from seepage within the annual open quarry pit, and supplemental water (if required) that will be trucked to the Project site from a licenced source. Hydrogeological testing was initiated in January 2019 to confirm sufficient and sustainable groundwater volumes for plant processes while preserving the integrity of the aquifer. If required, two 3 m tall x 30.5 m diameter water storage tanks will be installed on-site to provide supplementary water for plant processes.

As part of the pre-construction exploration activities under the CPS quarry leases, CPS has installed several groundwater test wells to gather adequate information on the potential for Project process water to be sustainably sourced from groundwater. Select groundwater test wells will remain in place throughout operation and groundwater quality and quantity will continue to be monitored during the construction and operation phases in accordance with EA Licence requirements.

20.4.3 Waste Management

As indicated in Section 20.3.2, no process water will be discharged. The sand wash process does not generate wastewater or tailings. Solids from a thickener tank during the sand wash process are transferred to a filter press to complete dewatering. The ‘filter cake’ (by-product generated in the filter press) will be hauled back to the quarry and included in site reclamation. The clarified water is pumped back to the wet plant for continued use in the closed-loop processing system.

Wastewater from washroom and shower facilities along with the cafeteria will be directed to a septic holding tank. The septic holding tank will be pumped out by a licensed local contractor on an as-needed basis and will be disposed at a licenced local wastewater treatment facility.

Domestic and commercial waste will be removed from the Project site by a licensed local contractor and disposed of at a licensed landfill. Recyclable materials will be collected in designated recycling containers and transported to a recycling facility.

20.4.4 Air Quality Management

The closest existing regional influences of air quality are associated with vehicle traffic on adjacent community roads and Provincial Road (PR) 304. To mitigate Project effects on air quality, the sand wash and dry facility, including all conveyors and transfer points, will be enclosed and under negative pressure to allow fines to be collected in a bag house fabric filter dust collection system to minimize dust projection. Sand truck transport loads will be completely contained with a waterproof sealed load cover which will mitigate dispersion of fugitive sand dust during transport. Project-related emissions will be minimized by regularly maintaining equipment and vehicles and minimizing idling of vehicles. Power use for the long-term operation of the Project will be obtained from hydroelectric power via a planned powerline which will minimize the need for power from portable generators.

In accordance with Manitoba Sustainable Development guidelines, air dispersion modeling was conducted to estimate the expected impacts on air quality resulting from Project activities. The Project operations were assessed in accordance with the Draft Guidelines for Air Quality Dispersion Modelling Manitoba (MCWS, November 2006) using AMS/EPA Regulatory Model (AERMOD) environmental software to predict maximum ground-level concentrations, as well as maximum predicted concentrations at selected nearby sensitive receptors, of the following:

- Nitrogen Dioxide (NO_2);
- Carbon Monoxide (CO);
- Particulate Matter (PM_{10} and $PM_{2.5}$); and
- Sulfur Dioxide (SO_2).

Model results were compared with the Manitoba Ambient Air Quality Criteria (MAAQC, 2005). Predicted maximum concentrations of SO_2 and CO were below the associated MAAQC across the modelling domain.

During the Project operation phase, CPS will establish air quality monitoring stations within the Project site and the vicinity of potential receptors closest to the Project activities. Air quality reports will be submitted to Manitoba Sustainable Development at the frequency required by Manitoba Sustainable Development. Should air quality issues arise that require mitigation, CPS will engage with Manitoba Sustainable Development to determine appropriate adaptive management to resolve issues as required.

20.4.5 Land Management

CPS has exclusive control of the Quarry Leases necessary for the Project. As per the *Mines and Minerals Act*, a quarry lease conveys to the lessee, for the term of the lease, the exclusive right to the Crown quarry minerals specified in the lease that are found on or under the land covered by the lease and that are the property of the Crown. No person shall commence production of a quarry mineral that is the property of the Crown except under the authority of a quarry permit or a quarry lease granted under the Act (or where a permit is issued by the Director).

In addition to the issued Quarry Leases, CPS has applied for control of surface leases for the Project area. The surface lease allows the lessee right of entry onto the land covered by the surface lease and to install or operate machinery or equipment in connection with development or extraction of the mineral resource. Hence, CPS has applied for additional rights that are not covered through Quarry Lease rights to construct buildings and ancillary infrastructure associated with the Project

Rental for a surface lease is $7 per hectare or fraction thereof per year but not less than $144. A lease is issued for a term not exceeding ten years, and is renewable for further terms of ten years, provided regulatory requirements are met.

20.5 Social Issues

20.5.1 Labour and Employment Support

It is estimated the Project will require up to 100 employees for peak production during mine operation season with fewer required during winter months when mining operations are halted and reclamation/preparation activities at the mine site are underway.

Letters of support from the local communities, including Incorporated Community of Seymourville, the Northern Affairs Settlement of Aghaming and Hollow Water First Nation, have indicated that community benefits such as employment, business and training opportunities are key factors in their collective support for the Project.

CPS has entered into an Economic Participation Agreements with Hollow Water First Nation and the Incorporated Community of Seymourville that provide for various economic and social benefits and opportunities, including employment, contracting and training initiatives.

20.5.2 Indigenous Groups

The Project is located on provincial Crown lands that come within approximately 200 of the western boundary of Hollow Water First Nation reserve and within the core area of their Traditional Territory, referred to as Hollow Water First Nation's Home Block. A TEK Study conducted with Hollow Water First Nation specifically for this Project, in addition to regional area TEK information from the East Side Road Authority all-season road project between PR 304 to Berens River, has indicated that the Project site area is not as important to the Hollow Water First Nation for resource use and traditional purposes as the adjacent regional area. However, the Hollow Water First Nation community trapline transects the Project site area and some local Indigenous people use the Project site area for gathering berries and other resource uses such as hunting.

CPS has engaged with local communities, which include Indigenous peoples, regarding various aspects of the Project during no less than 60 meetings in addition to holding a Project Information Session on November 28, 2018 in Seymourville*.* This proactive community outreach initiative by CPS has resulted in Letters of Support for the Project from the local communities of Seymourville, Aghaming and Hollow Water First Nation and Economic Participation Agreements with Hollow Water First Nation and Seymourville as indicated in Section 20.4.1. With respect to the Economic Participation Agreement with CPS, Hollow Water First Nation has acknowledged in a letter dated December 6, 2018 to Manitoba Sustainable Development that the Project operation activities will be taking place within Hollow Water First Nation's Home Block lands. Potential adverse impacts to trapping are addressed in the Economic Participation Agreement with Hollow Water First Nation.

An Operational Oversight Committee comprised of local Indigenous community representatives will provide Project support for the operation phase of the Project. This committee will meet no less than quarterly to review and approve third-party compliance data, quarry plans and restoration and rehabilitation activities. This committee will also be responsible for annual investigation of the area to be disturbed for the coming year, and adverse effects to trappers will be regularly monitored through the Operational Oversight Committee.

Hollow Water and Seymourville Elders Committees, comprised of local respected community elders, will also be established to provide long-term strategic guidance to CPS regarding the Project. The Elders Committees will meet no less than twice per year.

20.6 Closure Plan and Financial Assurance

At the request of Manitoba Sustainable Development, a Draft Closure Plan has been developed and submitted to Manitoba Sustainable Development for this Project in accordance with the Manitoba Mine Closure Regulation 67/99 General Closure Plan Guidelines available at: https://www.gov.mb.ca/iem/mines/acts/closureguidelines.html. This Project is already licenced under *The Environment Act*. For this reason, the cost estimate associated with a required Closure Plan under *The Mines and Minerals Act* has not been provided at this time. Although not specifically required under *The Environment Act*, closure cost estimates and financial assurances will be submitted by CPS to Manitoba Sustainable Development as part of the Project licensing process as per the EA Licence. This will include a request for closure cost estimates and financial assurance in the form of: 1) a permit bond; 2) an irrevocable letter of credit; or 3) another acceptable security. The type of financial assurance provided by CPS will be decided upon approval of a Closure Plan.

The final Closure Plan will be developed for review and approval by Manitoba Sustainable Development, as set out in the EA Licence conditions. The proposed Closure Plan will outline detailed mitigation and monitoring activities that will be implemented to rehabilitate the Project site during the closure phase of the Project.

The objective of the Closure Plan, as stipulated in the Manitoba Mine Closure Regulation 67/99 General Closure Plan Guidelines, is to restore the site to a satisfactory condition by:

- Eliminating unacceptable health hazards and ensuring public safety;
- Limiting the production and circulation of substances that could damage the receiving environment and, in the long-term, eliminate the need for maintenance and monitoring;
- Restoring the site to a condition in which it is visually acceptable to the community; and
- Reclaiming for future use the areas where infrastructures are located.

The Closure Plan is required to include details on the aspects of Project closure that are needed to develop an estimate of closure costs. For this Project, the Closure Plan will consider the following relevant aspects as applicable:

- Revegetation
- Contaminated soils
- Buildings and surface infrastructure
- Open pit work
- Dewatering ponds
- Mine/quarry rock piles
- Sedimentation ponds
- Water collection
- Sanitary installations
- Petroleum products
- Hazardous waste

20.7 Discussion of Environmental and Permitting Risks to Resource/Reserve Extraction

The authors conclude that CPS has conducted a reasonable amount of environmental studies, permitting investigation and social/community outreach to this stage of the

Wanipigow Sand Project. In obtaining an EA Licence on May 16, 2019, CPS may now proceed with approval applications including plans associated with the terms and conditions of the EA Licence in conjunction with abiding by, or applying for, by other federal, provincial and/or municipal licences, authorizations, permits and/or approvals. Some of these activities have already been initiated, but the Company must now set specific timelines to complete the various environmental initiatives to advance the Wanipigow Sand Project to the mining stage.

The Company is subject to numerous risk factors that may affect its business prospects in the future. These include risks inherent to environmental, regulatory and permitting risks. All phases of the Company's operations are subject to environmental regulation in the various jurisdictions in which it operates. These regulations, among other things, mandate the maintenance of air and water quality standards, land reclamation, transportation, storage and disposal of hazardous waste. Environmental legislation is evolving in a manner which will require stricter standards and enforcement, increased fines and penalties for non-compliance, more stringent environmental assessments of proposed projects and a heightened degree of responsibility for companies and their officers, directors, and employees. There is no assurance that future changes in environmental regulation, if any, will not adversely affect the Company's operations. To the Company's knowledge, there are no environmental risks or hazards to date that could materially impact the issuer's ability to extract the mineral resources or mineral reserves.

CPS has obtained the required Quarry Leases, EA Licence and Conditional Use Order for the targeted sand resource area, which collectively provide the authority to remove the sand from Crown lands. There are no known or expressed environmental concerns related to this Project that cannot be mitigated.

Public review of the Project, as required under *The Environment Act*, resulted in four letters submitted to the Canadian Environmental Assessment Agency (CEA Agency) by the public requesting that the Project be 'Designated' under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and require a federal environmental assessment. CPS provided the CEA Agency with all requested Project information, including:

- Responses to CEA Agency questions;
- A cumulative impact assessment for the Project;
- The EAP; and
- The government Technical Advisory Committee and public responses to their comments for the provincial EAP review process.

The Minister considered all information submitted and determined that the Project would not be 'Designated' under the CEAA, 2012, and therefore would not be subject to federal environmental oversight. There are no additional known permitting risks associated with the Project.

21 Capital and Operating Costs

21.1 Capital Costs

Capital expenditure estimates were provided by contractors and developed by using first principles and applying direct project experience, where available.

The accuracy of the capital expenditure estimate is +/-10%.

The following cost estimates are detailed in this section:

- Initial Capital Cost – those costs incurred to develop the property to a production rate of approximately 1.3 million tonnes per year.
- Sustaining Capital Cost- costs incurred during operations to maintain production.
- Salvage Value – was not considered in the Preliminary Feasibility Study for the possible asset value at the end of the mine life.

The capital expenditure estimate for the CPS wet and dry plant, loadout and related infrastructure is approximately CDN$124 million, with a contingency of approximately CDN$10 million. Additionally, the company expects to lease mobile equipment in order to minimize upfront expenditures. Mobile equipment lease payments are estimated to total approximately CDN$105 million over the life of the mine (LOM). A further CDN$14 million are contemplated for miscellaneous development and rebuilds for sustaining capital expenditures over the LOM. As a result, the total capital expenditure and lease-related costs are estimated at CDN$250 to CDN$255 million for LOM plan. The Capital Cost detail for Plants, Loadout and related infrastructure is presented in Figure 21.1.

The Initial Capital Cost estimate is based upon a quote from Hi-Crush Inc. (HCI), a premier provider of proppant and logistics solutions to the North American petroleum industry. Table 21.1 is a breakdown by category of the Initial Capital Cost estimate.

Leased mobile equipment utilized by the company is not included in the above capital expenditure figures; rather, it is included in the operating costs. Over the first two years, CPS is expected to lease articulated trucks, excavator, tractors, wheel loader, water and service truck, skid steer, manlift, lull and general pickups with annual lease costs totaling CDN$5.0 to $6.0 million. Over the life of the mine, mobile equipment capital lease costs are expected to be approximately CDN$105 million.

Sustaining capital expenditures are incurred to maintain production and expected to be in the range of CDN$0.75 per tonne, or CDN$14 million over LOM.

Exclusions from the capital expenditures estimate include, but are not limited to, project financing and interest charges and working capital.

Figure 21.1 Capital Cost Detail for Plants, Loadout and Related Infrastructure.

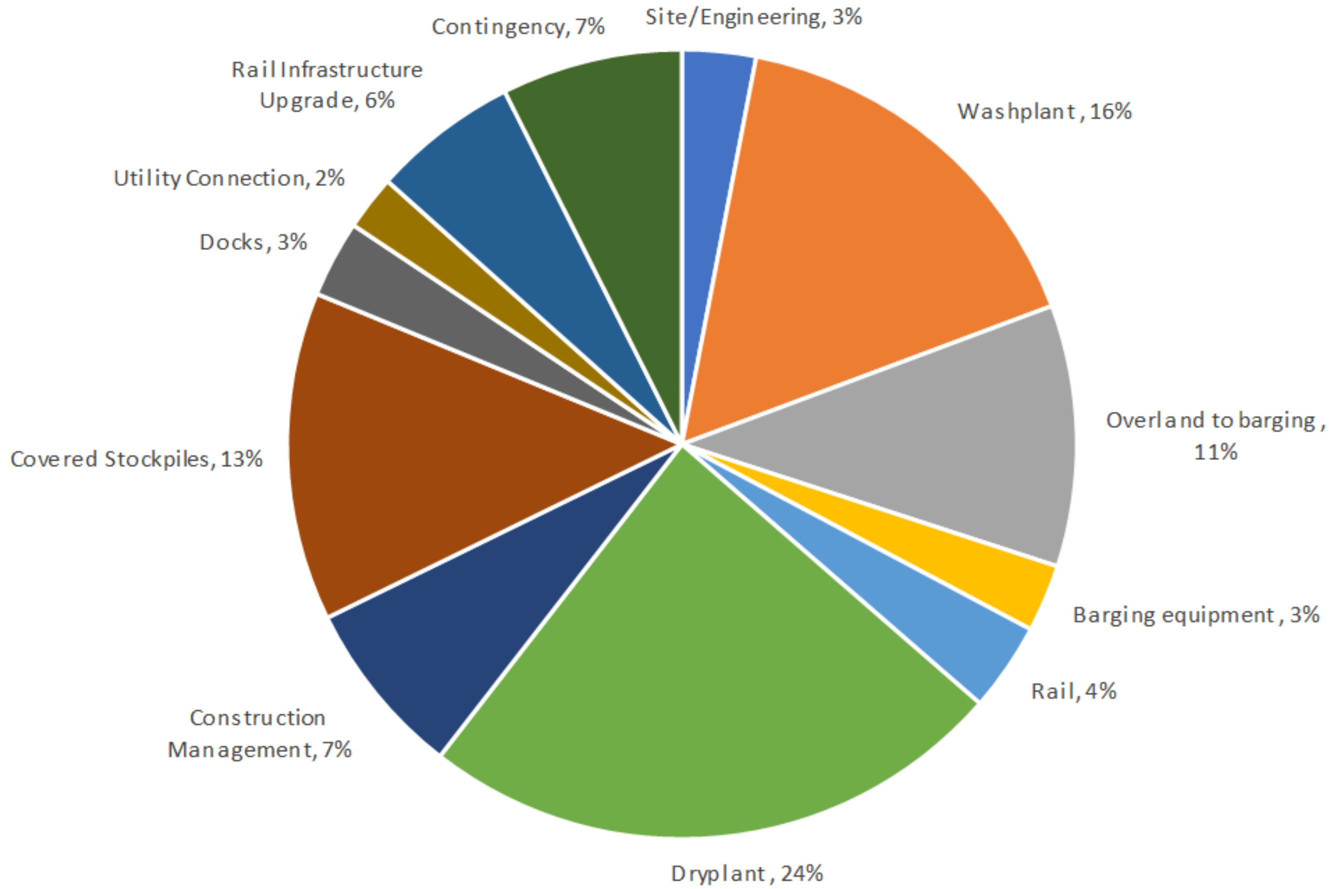


Table 21.1 Breakdown by category of the Initial Capital Cost estimate.

Initial Capital	C$'000
Site/Engineering	$4,037
Washplant	$21,771
Overland to barging	$8,579
Barging equipment	$2,427
Barge unloading equipment	$1,264
Rail	$4,855
Overland to WIP	$5,732
Dryplant	$32,224
Construction Management	$9,706
Covered Stockpiles	$18,000
Docks	$4,200
Utility Connection	$3,000
Rail Infrastructure Upgrade	$8,000
Contingency	$9,903
Total	**$133,697**

21.2 Operating Costs

The operating costs are based primarily on CPS employees working jointly with HCI contractors under an operating agreement, until CPS employees are sufficiently trained to assume independent operation of the operation.

CPS manpower expectations are to scale up to four rotating shifts for the mine, wet plant and dry plant by year 2, when saleable product doubles to nearly 1.25 million tonnes.

At full capacity, CPS is expected to employ 12 salaried (8 operating and 4 corporate and/or administrative) and 91 hourly employees.

Operating cost estimates were provided by CPS. These were reviewed by BOYD and found to be reasonable and appropriate for a Preliminary Feasibility Study. A summary of the first five years of operating costs and associated unit costs (per sales tonne) is presented in Tables 21.2 and 21.3 and Figure 21.2. Annual operating costs are estimated on a constant dollar basis.

In addition to the previous direct operating costs, Indirect Costs in our model are comprised of barging, royalties and an expense for reclamation accrual. Our barging estimate is based upon a proposal to CPS from McKeil Marine Limited. The estimate to transport sand from a loadout in the Rural Municipality of St. Andrews via the Lake Line Railroad to a Class 1 railroad near Selkirk is CDN$3.62 per sales tonne. It is estimated that an additional interswitch rail fee of CDN$74 per railcar would also be incurred.

Fringe benefits are included in the total costs.

Royalty costs are estimated to be in the range of CDN$3.00 to CDN$4.50 per saleable tonne and are dependent upon specific areas of mining within the existing leases.

Rehabilitation levy is estimated to be CDN$0.12 per sales tonne for the first 5 years, based upon information provided by CPS.

Table 21.2 Summary of the first five years of operating costs.

	$C'000				
Category	Year 1	Year 2	Year 3	Year 4	Year 5
Labor	3,926.7	6,287.4	6,287.4	6,287.4	6,287.4
Mobile Equipment: Lease Costs, Repairs & Maintenance	4,795.5	9,706.9	9,512.7	9,773.3	9,706.5
Outside Services	350.0	350.0	350.0	350.0	350.0
Electricity	1,634.8	2,331.5	2,304.0	2,340.9	2,331.5
Fuel	0.0	0.0	0.0	0.0	0.0
Operating Agreement	821.1	1,662.0	1,628.7	1,673.3	1,661.9
Barge Transportation	6,975.9	14,120.5	13,838.0	14,217.1	14,119.9
Royalties	1,795.9	5,628.6	5,265.8	5,410.0	5,373.1
Rehabilitation Levy	74.1	150.0	147.0	151.0	149.9
Total Operating Costs	**20,373.8**	**40,236.8**	**39,333.5**	**40,203.0**	**39,980.2**

Figure 21.2 Summary of the first five years of annual sales (tonnes).

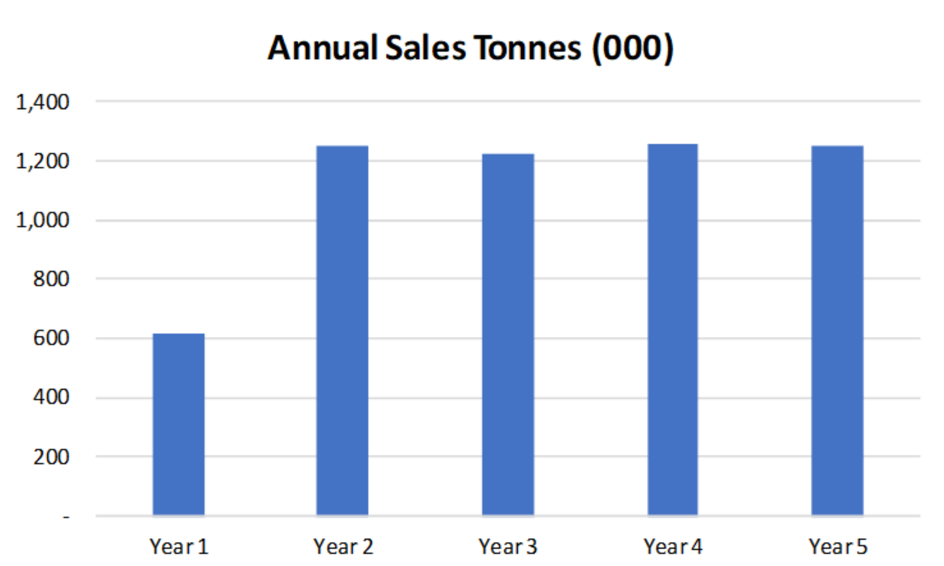


Table 21.3 Summary of the first five years unit costs (per sales tonne).

	$C (per sales tonne)				
Category	Year 1	Year 2	Year 3	Year 4	Year 5
Labor	$ 6.36	$ 5.03	$ 5.13	$ 5.00	$ 5.03
Mobile Equipment: Lease Costs, Repairs & Maintenance	$ 7.77	$ 7.77	$ 7.77	$ 7.77	$ 7.77
Outside Services	$ 0.57	$ 0.28	$ 0.29	$ 0.28	$ 0.28
Electricity	$ 2.65	$ 1.87	$ 1.88	$ 1.86	$ 1.87
Fuel	$ -	$ -	$ -	$ -	$ -
Operating Agreement	$ 1.33	$ 1.33	$ 1.33	$ 1.33	$ 1.33
Barge Transportation	$ 11.30	$ 11.30	$ 11.30	$ 11.30	$ 11.30
Royalties	$ 2.91	$ 4.50	$ 4.30	$ 4.30	$ 4.30
Rehabilitation Levy	$ 0.12	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Total Operating Costs	**$ 33.00**	**$ 32.20**	**$ 32.12**	**$ 31.95**	**$ 32.00**

22 Economic Analysis

22.1 Cash Flow Projection

Under NI 43-101, BOYD has performed an economic analysis of the mine using the estimates presented in this report. We confirmed that the projected outcome is a positive cash flow that supports the statement of Mineral Reserves.

A cash flow projection has been generated from the LOM production schedule and the associated capital expenditure and operating cost estimates. A summary of the key criteria is provided below.

- Net revenues are forecasted at the rail loadout in the Rural Municipality of St. Andrews.
  - Based upon sales of 20/40, 40/70 and 70/140 mesh sizes
  - Delivered frac sand prices by basin were provided by CPS and total revenues were reduced for logistics pass through costs between the rail loadout at the Rural Municipality of St. Andrews and various basin loadouts. Pricing was further reduced for lower commodity price curves (Source: Deloitte and Sproule as of 31 December 2019).
  - Delivered by train to the following destinations:
    - Bakken in North Dakota, Manitoba and Saskatchewan
    - Viking/Shaunavon in Alberta and Saskatchewan
    - Montney in Alberta and British Columbia

        - Duvernay in British Columbia

- Operating Costs include:
    - Labor – hourly and salary
    - Repairs and Maintenance –mobile equipment and plants
    - Outside Services – quality control, safety, environmental and office
    - Electricity – wet and dry plant
    - Fuel – propane and diesel
    - Leased mobile equipment
    - Hi-Crush Operating Agreement
    - Barge Transportation – from the mine to the rail loadout in the Rural Municipality of St. Andrews
    - Selling, General and Administrative
    - Royalties
    - Rehabilitation Levy – reclamation accrual
- Capital Expenditures include:
    - Upfront – mine, wet and dry plant, and related infrastructure
    - Maintenance
- Taxes – Net Federal Taxes (15%) plus Manitoba Provincial (12%)

All financial results are in Canadian dollars (CDN$ or CAD$). All volumes are in metric tons (tonnes).

22.2 Cash Flow Analysis

The Canadian Premium Sand project has an after-tax Net Present Value (NPV) of CDN$290.7 million, discounted at an 8% discount rate (Table 22.1). The after-tax Internal Rate of Return (IRR) is 46.0%. Taxes include federal (15%) and provincial (12%; Manitoba) and assume capital loss carry forward. All unit frac sand pricing and costs are estimated on a constant dollar basis.

Table 22.1 Cash flow analyses (CDN$'000).

	$C '000							
Category	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Years 6-10**	**Years 11-20**	**Total**
Net Revenues at Loadout (RM of St. Andrews)	46,627.8	94,323.5	94,694.3	99,298.8	99,912.1	462,601.8	1,019,505.4	1,916,963.8
Cost of Goods Sold	20,373.8	40,236.8	39,333.5	40,203.0	39,980.2	187,121.8	397,251.0	764,500.1
Capital Expenditures	133,696.8	0.0	0.0	943.6	937.2	4,336.1	7,612.0	147,525.7
Pre-Tax Net Cash Flow	-107,442.8	54,086.7	55,360.9	58,152.1	58,994.8	271,143.9	614,642.4	1,004,938.0
Taxes	0.0	0.0	0.0	11,491.2	15,928.6	73,208.9	165,953.4	266,582.1
After-Tax Net Cash Flow	**-107,442.8**	**54,086.7**	**55,360.9**	**46,660.9**	**43,066.2**	**197,935.0**	**448,688.9**	**738,355.9**

Note: Net Revenues are at the rail loadout in the Rural Municipality of St. Andrews and do not include logistics pass-thru costs.

22.3 Sensitivity Analysis

Pre-tax and after-tax sensitivity analyses for the cash flow were prepared considering changes in sales pricing and operating costs and are summarized in Table 22.2.

Table 22.2 Pre-tax and after-tax sensitivity tables (CDN$'000).

Pre Tax NPV		Revenue Sensitivity								
		-30.0%	-20.0%	-10.0%	-5.0%	0.0%	5.0%	10.0%	20.0%	30.0%
Cost Sensitivity	-30.0%	$59,943	$211,165	$362,386	$437,997	$513,607	$589,218	$664,828	$816,050	$967,271
	-20.0%	$22,376	$173,597	$324,818	$400,429	$476,039	$551,650	$627,261	$778,482	$929,703
	-10.0%	($16,338)	$134,883	$286,104	$361,715	$437,326	$512,936	$588,547	$739,768	$890,989
	-5.0%	($36,125)	$115,097	$266,318	$341,928	$417,539	$493,150	$568,760	$719,982	$871,203
	0.0%	($56,198)	$95,024	$246,245	$321,855	$397,466	$473,077	$548,687	$699,909	$851,130
	5.0%	($76,557)	$74,664	$225,885	$301,496	$377,107	$452,717	$528,328	$679,549	$830,770
	10.0%	($97,203)	$54,018	$205,239	$280,850	$356,460	$432,071	$507,682	$658,903	$810,124
	20.0%	($139,355)	$11,866	$163,088	$238,698	$314,309	$389,920	$465,530	$616,752	$767,973
	30.0%	($182,652)	($31,431)	$119,790	$195,401	$271,012	$346,622	$422,233	$573,454	$724,675

Pre Tax IRR		Revenue Sensitivity								
		-30.0%	-20.0%	-10.0%	-5.0%	0.0%	5.0%	10.0%	20.0%	30.0%
Cost Sensitivity	-30.0%	14.6%	30.6%	48.2%	57.9%	68.4%	79.8%	92.1%	120.2%	154.2%
	-20.0%	10.5%	26.5%	43.5%	52.9%	63.0%	73.8%	85.6%	112.5%	144.7%
	-10.0%	6.1%	22.4%	38.9%	47.9%	57.6%	68.0%	79.3%	104.9%	135.5%
	-5.0%	3.6%	20.3%	36.5%	45.4%	54.9%	65.1%	76.2%	101.1%	131.0%
	0.0%	0.9%	18.2%	34.2%	42.9%	52.2%	62.2%	73.0%	97.4%	126.5%
	5.0%	-2.3%	16.0%	32.0%	40.5%	49.6%	59.4%	70.0%	93.8%	122.1%
	10.0%	-6.4%	13.9%	29.7%	38.1%	47.0%	56.6%	66.9%	90.2%	117.7%
	20.0%	NA	9.3%	25.1%	33.2%	41.8%	51.0%	60.9%	83.0%	109.2%
	30.0%	NA	4.3%	20.6%	28.5%	36.7%	45.5%	55.0%	76.1%	100.9%

After Tax NPV		Revenues								
		-30.0%	-20.0%	-10.0%	-5.0%	0.0%	5.0%	10.0%	20.0%	30.0%
Costs	-30.0%	$28,360	$151,050	$264,901	$320,686	$376,213	$431,683	$487,154	$597,839	$708,665
	-20.0%	($2,204)	$120,502	$237,173	$292,957	$348,645	$404,115	$459,586	$570,376	$681,202
	-10.0%	($33,744)	$89,020	$208,599	$264,383	$320,167	$375,706	$431,176	$542,075	$652,901
	-5.0%	($49,864)	$72,929	$193,884	$249,778	$305,563	$361,186	$416,656	$527,597	$638,436
	0.0%	($66,235)	$56,604	$178,956	$234,962	$290,746	$346,455	$401,926	$512,867	$623,762
	5.0%	($82,884)	$40,047	$162,737	$219,934	$275,719	$331,503	$386,985	$497,926	$608,588
	10.0%	($100,026)	$23,256	$145,946	$204,657	$260,479	$316,263	$371,834	$482,775	$593,495
	20.0%	($139,355)	($11,057)	$111,664	$173,009	$229,366	$285,150	$340,900	$451,841	$562,680
	30.0%	($182,652)	($46,337)	$76,449	$137,794	$197,304	$253,190	$308,974	$420,067	$531,008

After Tax IRR		Revenues								
		-30.0%	-20.0%	-10.0%	-5.0%	0.0%	5.0%	10.0%	20.0%	30.0%
Costs	-30.0%	11.6%	26.9%	42.5%	51.0%	60.0%	69.6%	80.1%	103.0%	131.7%
	-20.0%	7.7%	22.9%	38.4%	46.6%	55.4%	64.6%	74.6%	96.9%	124.2%
	-10.0%	3.6%	18.9%	34.4%	42.2%	50.7%	59.6%	69.2%	90.9%	116.8%
	-5.0%	1.2%	16.9%	32.4%	40.1%	48.4%	57.2%	66.5%	87.9%	113.2%
	0.0%	-1.3%	14.9%	30.3%	38.0%	46.0%	54.8%	63.9%	84.7%	109.6%
	5.0%	-4.3%	12.9%	28.2%	35.8%	43.7%	52.3%	61.3%	81.5%	104.5%
	10.0%	-8.0%	10.9%	26.0%	33.7%	41.5%	49.9%	58.7%	78.4%	101.1%
	20.0%	NA	6.6%	21.6%	29.4%	37.0%	45.0%	53.6%	72.4%	94.3%
	30.0%	NA	1.9%	17.2%	24.8%	32.5%	40.2%	48.4%	66.5%	87.7%

23 Adjacent Properties

An adjacent property means a property: 1) in which the issuer does not have an interest; 2) that has a boundary reasonably proximate to the property being reported on; and 3) that has geological characteristics similar to those of the property being reported on.

This section contains references to silica sand and silica sand mining that has taken place off the Wanipigow Property. The authors have been unable to verify this information and therefore the information is not necessarily indicative to the mineralization on the Wanipigow Property.

To follow discussion in this section, the reader is referred to Figure 23.1.

23.1 Black Island

Historically, numerous silica sand quarry operations were located on Black Island, which is approximately 5 km west of the Property. The island and historical quarry operations are presently with a Provincial Park and quarrying is no longer permitted.

The silica sand operations on Black Island had been intermittently active from 1910-2003 and are described by Spiece (1980), Pearson (1984) and Watson (1985) as summarized below:

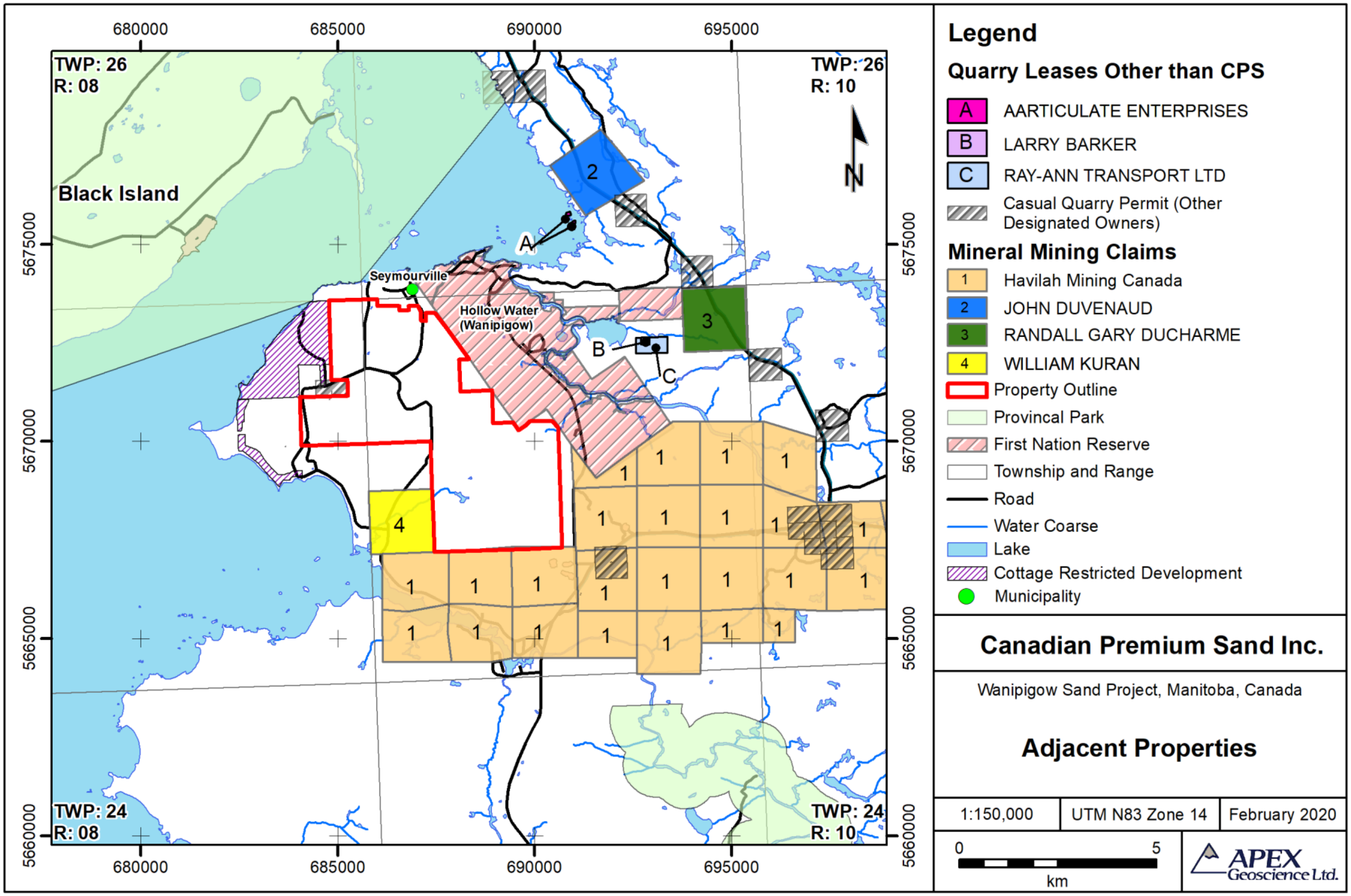
- 1929-1932: Lakeshore Sand and Gravel, quarried and barged silica sand from both the north and south shores of the island to Mid-West Glass in Winnipeg. The operation was concentrated on the south shore until 1930 where the company constructed a 365 m pier to better facilitate barge loading. The operation was shut down in 1930 due to problems maintaining the pier.

- 1950: Dyson Limited quarried sand from the north shore and shipped it to their plant in Selkirk.

- 1962: The Selkirk Silica Division of The Winnipeg Supply and Fuel Company renewed quarrying on the southern shore.

- 1969-2003 Steel Brothers acquired the Black Island operation from Selkirk Silica Division and quarried up to 100,000 tons per year from the LBI unit of the Winnipeg formation. The sand was processed on site by a wash plant, stockpiled. and barged to Selkirk. Quarrying operated all year, but sand was shipped during the summer.

Figure 23.1 Adjacent properties to the Wanipigow Sand Project.



23.2 Other Quarry Interests

23.2.1 Casual Quarry Permits

There are several active Casual Quarry Permits in property area. A casual Quarry permit on designated land survey NE/NW-25-025-008-E1 are surrounded by CPS Quarry leases (1693, 1682, 1680 and1679). Casual quarry permits as described in the Quarry Minerals Regulation, 1992 of the *Mines and Mineral Act*, authorizes the holder to produce a specified quantity of the quarry mineral as listed in their permit for a selected duration of time. A permit may be issued to multiple parties for the same quarry mineral and the same area of land at the same time. Causal Quarry permits adjacent to the property are presently for aggregate sand and gravel only.

23.2.2 Quarry Withdrawals

Several areas adjacent to the property have been withdrawn from quarry staking by the Crown and are currently reserved for use by Manitoba Infrastructure.

23.2.3 Other Quarry Leases

There are additional active Quarry Leases in the area of the Property. Aarticulate Enterprises holds the Rock and Stone rights to QL-579 and QL-580 located on Storey and Lewis islands approximately 4 km northeast of the Property. Larry Barker holds the Gravel, Rock/Stone and shale rights to QL-2496 and Ray-Anne Transport Ltd. Holds the Rock/stone and Shale rights to QL-. 2685. Both leases are located approximately 5 km east of the property.

23.3 Mineral Mining claims

There are active Mineral Mining Claims held by William Kuran and Havilah Mining Canada, which are adjacent to the southern border of the Wanipigow Sand Project. Mineral Mining Claims grant the owner the exclusive right to explore for and develop the Crown minerals located on or underneath the claim with the exception of Quarry minerals.

23.4 Private Property

The eastern side of the property borders the private cottage divisions of Ayers Cove and Pelican Harbour. It is a cottage restricted development area. The village of Seymourville and the First Nations community of Hollow Water are the two larger private communities to the west of the property.

24 Other Relevant Data and Information

As of the Effective Date of this Technical Report, there is no other relevant data or information to be communicated to the reader.

25 Interpretation and Conclusions

The Wanipigow Sand Project has advanced to a stage where the geological model has a high level of confidence, a preferred open pit mining method is established, and an effective method of mineral processing is determined. Financial analysis has been conducted and is based on reasonable assumptions of Modifying Factors and evaluation of other relevant factors. This information was deemed sufficient by the QP to determine those parts of the Mineral Resource that may be converted to a Mineral Reserve at the time of reporting this updated 2020 Preliminary Feasibility Study. Key findings of the Preliminary Feasibility Study are provided in the following text.

25.1 CPS 2018 Exploration Program

In September to December 2018, CPS completed a 93-drillhole (1,574 m) program over an area of approximately 10 km^2. The program achieved a 94% core recovery rate in which 763 core samples were collected at 1.5 m intervals. Based on drill logs, lithological observations and grain size particle distributions, this study subdivides the Winnipeg Formation into four distinguishable subunits that include from bottom to top (along with their average thicknesses): Lower Black Island (LBI; average 7.9 m thick); Black Shale (BS; average 2.0 m thick); Upper Black Island (UBI; average 4.6 m thick); and Pleistocene glaciofluvial (Pgf; average 10.7 m thick). The strata are generally flat-lying, and hence, this thickness can be considered to represent the true thickness of the formation.

The proppant test work results show the Wanipigow Sand Project Black Island Member silica sand generally satisfies the recommendations set forth in International Standards ISO 13503-2:2006/Amd.1:2009E for sieve size fractions, sphericity, roundness, acid solubility and turbidity and crush classification. The LBI/UBI has slightly lower roundness and crush strength values in comparison to Northern White *sensu stricto* – and hence the senior author concludes that the Wanipigow LBI/UBI sand is a slightly less geologically super-mature Northern White sand type.

The Pleistocene glaciofluvial sand at the Wanipigow Sand Project is of lower quality than the LBI or UBI sand. However, it was observed that the Wanipigow Property includes surficial deposits that are characterized by localized exfoliated and/or reworked Winnipeg Formation bedrock silica sand that is intermixed with glaciofluvial, glaciolacustrine and till. It is possible, therefore, that the Pgf is not exclusively classified as waste material. In addition, the Pgf could have potential for other applications such as road building or concrete manufacturing as part of CPS's proposed development process

Accordingly, and with respect to reporting a resource estimate that abides by NI 43-101, the CPS proppant test work results show the quality of the Black Island Member silica sand from the Wanipigow Sand Project and at least portions of the overlying Pleistocene glaciofluvial material has reasonable prospect of economic extraction. It is the QP's opinion that it is reasonable to include all data generated during CPS' 2018 exploration program into the resource/reserve modelling, evaluation and estimations as part of the Wanipigow Sand Project updated 2020 Preliminary Feasibility Study.

25.2 Mineral Resource Estimations

The calculation of the Wanipigow Property Silica Sand Resource Estimate was completed using the commercial mine planning software MICROMINE (v 18.0). The 3-D geological model utilized information from 93 vertical drillholes to define Pgf, UBI, BS and LBI geological units and 744 gradation analysis that form the ‘assay’ file used to calculate the Wanipigow Property Silica Sand Resource Estimate. The Wanipigow Property Silica Sand Resource Estimate includes the Pgf, UBI, and the LBI. The interstitial BS was examined only to calculate an estimate of the volumes/tonnages of waste material situated within the resource.

The resource is calculated using a block model with a size of 20 by 20 m in the horizontal directions and 2 m in the vertical direction. Ordinary Kriging (OK) was used to estimate the size fraction values at each parent block that lies within the Pgf, UBI, and LBI wireframe.

The authors considered several factors for the Mineral Resource classification of the Pgf, UBI and LBI units from the Wanipigow Sand Project including: drillhole spacing; nature of the geological contacts; the degree of testing; proppant quality, and lateral and vertical continuity. The authors have a high level of confidence in, and understanding of, the geology and quality of the LBI geo-unit and have classified the LBI as a Measured Resource. There is a lower confidence level of the LBI resource at the margins of the drillhole density, or when the unit boundary cannot be determined to the same degree as within the measured resource area, and therefore, portions of LBI have lower classification levels such, the LBI is reported as both Measured and Indicated Resources.

The UBI geo-unit is less prevalent than the LBI in the Wanipigow Sand Project area. The lower boundary between the UBI and the underlying BS is well defined, however, the upper UBI boundary with the Pgf is less certain and may be intercalated in places. The UBI has similar, if not better, Krumbein shape factor and crush resistance test results than the LBI geo-unit but has not undergone the same degree of proppant characterization test work as the LBI. Accordingly, the UBI resource classification is capped as an Indicated Resource with UBI areas of less certainty being classified as Inferred Resources. Lastly, the authors have assigned an Inferred Resource to the Pgf with the understanding that additional work is required to understand the spatial and processing parameters of the Pgf prior to advancing the geo-units resource classification level.

Nominal sand bulk densities of 1.897 g/cm^3, 1.911 g/cm^3, and 1.878 g/cm^3 were applied to Pgf, UBI, and LBI, respectively. The density values are based on 58 representative bulk density samples collected during the 2018 drill program and include 13 Pgf, 3 UBI, 6 BS, and 36 LBI samples.

The Wanipigow Property estimation of the individual size fractions is completed and reported using a lower cutoff of mesh-sizes that are greater than or equal to 20-mesh and less than or equal to 140-mesh fraction (i.e., the +20 and -140 size fractions are discarded from the estimation process). Mineral resources are not mineral reserves and do not have demonstrated economic viability. This Wanipigow Property Silica Sand Resource Estimate predicts the following total (i.e., global) resources:

- Lower Black Island Measured & Indicated Resources of 39.2 million tonnes;
- Upper Black Island Indicated Resource of 3.1 million tonnes and Inferred Resource of 1.7 million tonnes; and
- Pleistocene glaciofluvial Inferred Resource of 93.0 million tonnes (Tables 14.10 and 14.11).

With respect to unequivocal waste rock, the black shale geo-unit overlying the LBI resource has an estimated volume of 920,000 m^3 for a total weight of 1.7 million metric tonnes. The density of the BS was taken from compacted *in-situ* material bulk density tests on 6 samples that average 1.814 g/cm^3.

25.3 Mineral Reserve Estimation

The Mineral Reserve, which has been estimated using the geological model provided by the resource geologists (see Section 14), has appropriately considered modifying factors, and is supported by a detailed mine plan and cash flow model. The estimation was performed using industry-accepted practices and is reported in accordance with the 2014 CIM Definition Standards.

In this study, a Mineral Reserve is defined as the Measured and Indicated Mineral Resource that would be extracted by the mine design and which can then be processed and sold at a profit. The Measured resources meeting that standard are herein classified as Proven mineral reserves, while the Indicated resources meeting that standard are classified as Probable mineral reserves

The Mineral Reserve was derived from the Measured and Indicated Mineral Resource estimates and represents the portion of the Mineral Resource that has been converted to a Mineral Reserve through the application of appropriate Modifying Factors to potential mining volumes created during the mine design and planning process.

The mineral reserve expressed as saleable product tonnages estimates Proven & Probable reserves of:

- 21.3 million tonnes of LBI; and
- 2.8 million tonnes of UBI (see Table 15.1).

The Mineral Reserves estimated for the Wanipigow Silica Sand Project are subject to the types of risks common to most silica sand quarry operations that exist in Canada. These risks include but are not limited to site-specific mining and geological conditions, management and personnel capabilities, availability of funding to properly operate and capitalise the operation, variations in cost elements and market conditions, developing and operating the mine in an efficient manner, unforeseen changes in legislation and new industry developments.

Given the data available at the time the Preliminary Feasibility Study was prepared, the estimate presented herein is considered reasonable. However, the Mineral Reserve estimate should be accepted with the understanding that additional data and analysis available subsequent to the effective date of the estimate may necessitate revision. These revisions may be material. There is no guarantee that all or any part of the estimated Mineral Resource or Mineral Reserve will be recoverable.

To the extent known to the responsible QP, there are no known environmental, permitting, legal, title, taxation, socio-economic, marketing, political or other relevant factors that could materially affect the Mineral Reserve estimate that are not documented in this Report.

25.4 Mining Methods

The planned Wanipigow Silica Sand Project is projected to include a conventional, open pit quarry employing typical truck-and-excavator mining operations. The quarry is planned to operate 20 hours per day, 7 days per week ,212 days per year (weather permitting) and is expected to extract approximately 1.8 million tonnes of raw sand per year at full production. The WIP sand material will be conveyed to a barge loadout north of the mine site, transported south to a proposed site in the Rural Municipality of St. Andrews, dried and sorted for rail loadout.

At this mining rate, the operation will produce an average of 1.3 million product tonnes per year after processing losses. The quarrying and processing operations are planned to be in full production one year after start-up. The mine life is projected to be at least 20 years after which an estimated 9.9 million bcm of waste materials and 33.9 million tonnes of raw sand will have been mined.

Development of the quarry is scheduled to begin in 2022. In commercial mining terms, the planned quantities of overburden waste and sand to be mined each year the Wanipigow Silica Sand Project are considered modest. It is BOYD's opinion that the mining methods and performance levels incorporated in the TPS plan are reasonable, appropriate, and should be achievable under anticipated operating conditions. As such, the mine design and production plan are adequate for this report.

25.5 Economic Analysis

The capital expenditure estimate for the CPS wet and dry plant, loadout and related infrastructure is approximately CDN$124 million, with a contingency of approximately CDN$10 million. The total capital expenditure and lease-related costs are estimated at CDN$250 to CDN$255 million for life of mine plan. Operating costs are discussed for the first five years and are found to be reasonable and appropriate for a Preliminary Feasibility Study.

The Canadian Premium Sand project has an after-tax Net Present Value (NPV) of CDN$290.7 million, discounted at an 8% discount rate (see Table 21.1). The after-tax Internal Rate of Return (IRR) is 46.0%. Taxes include federal (15%) and provincial (12%; Manitoba) and assume capital loss carry forward.

25.6 Concluding Qualified Persons Statement

It is concluded that the work completed in the updated 2020 Preliminary Feasibility Study indicates that the mineral resource and mineral reserve estimates and Project economics are sufficiently defined to indicate that the Wanipigow Sand Project is technically and economically viable.

The Qualified Persons consider that the scientific and technical information available on the Wanipigow Sand Project can support proceeding with additional data collection, trade-off and engineering work and preparation of more detailed studies to optimize and achieve a higher level of design and costing accuracy (i.e., Feasibility Study). However, the decision to proceed with additional studies and/or mining operations on the Project is at the discretion of CPS.

25.7 Risks and Uncertainties

The authors have considered risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the exploration information, mineral resource or mineral reserve estimates.

In the opinion of the senior author of this Technical Report, exploration techniques and, specifically, the sampling and analytical procedures employed by CPS at the Wanipigow Sand Project are consistent with industry standards and are appropriate both with respect to the type of mineral deposit(s) being explored and with respect to insuring overall data quality and integrity.

With respect to mineral resources, mineral resources are not Mineral Reserves and do not have demonstrated economic viability. Silica sand resource estimates are by nature imprecise and depend to some extent on statistical inferences drawn from available data. To the best of the authors ability, the mineral resources presented in this Technical Report have adhered to best geostatistical practices.

One uncertainty was introduced to the mineral resource estimation process because of 2018 sampling procedures. The authors formulated two reasonable gradation values that were used to replace 26 sample intervals that were not sampled due to poor core recovery and/or stratigraphic intervals that had >30% clay or gravel, and therefore, did not have gradation data within the resource estimation domains (see Section 14.1.1).

In the instance of non-samples, the authors developed conservative clay and gravel samples that in no way, shape or form would cause an over-estimation in the resource estimation based on the non-sample value. The non-samples had sporadic distributions and could not be wireframed out of the resource. The decision on which of the two values to use in the non-sample blocks were decided by reviewing the surrounding lithology; hence, the clay value, for example, was implemented in areas where the local geology necessitated the clay value. This methodology was used to substitute gradation data for all 26 non-samples (or 3.5% of the overall estimation file). It is recommended that future core sampling programs collect core sample material from the entire drillhole interval to avoid non-sample areas within the resource domains for future resource estimations.

Risks and uncertainties that could reasonably be expected to affect the projected economic outcomes of the Wanipigow Sand Project could include:

- Changes to tight oil and gas developments and the abilities to market sand from the Wanipigow Sand Project;

- Assumptions concerning future prices of proppant, operating costs, mining technology improvements, development costs and reclamation costs;

- Securing and permitting of the Rural Municipality of St. Andrews dry process/rail site.

- Duration of lake navigation season.

- Assumptions concerning future effects of regulation, including the issuance of required permits such as mining and water rights, and the assessment of taxes by governmental agencies.

- Assumptions that potential revenue and cost structure will remain relatively constant over the life of the Wanipigow resources.

The business of exploration for, and development of, silica sand involves a high degree of risk and there can be no assurance that the current program will result in profitable operations. The Company's continued existence is dependent upon the preservation of its interest in the underlying properties, the discovery of economically recoverable resources/reserves, the achievement of profitable operations, and the ability of the Company to raise additional financing, if necessary, or alternatively upon the Company's ability to dispose of its interests on an advantageous basis.

Any future sale of proppant product is largely dependent on the economy and conditions of the oil and gas industry in western Canada and the United States, the operators of which utilize proppant in hydraulic fracturing. A downturn in the tight oil and gas market could result in potential impairment of any silica sand operation.

The ability of CPS, or any industrial sand producer, to achieve operational, quality, and financial targets at their operations is dependent on numerous factors that are beyond the control of, and cannot be fully anticipated by, the authors. These factors include mining and geological conditions, the capabilities of management and employees, variations in market conditions, the level of continued investments in mining operations, the ability to develop and operate in an efficient fashion, etc. Unforeseen changes in legislation and/or new industry developments in drilling/fracking technology could substantially alter the performance of any mining company within the proppant sand industry.

26 Recommendations

The authors of this Technical Report advise that CPS consider the following work recommendations at the Wanipigow Sand Project with the objectives to:

1. Enhance the economics of the deposit by upgrading inferred resource areas or geo-units to higher levels of resource/reserve classification by way of additional exploratory work;

2. Prepare the silica sand resources/reserves to a feasibility level of mine design and costing accuracy and/or open pit mining and mine production phases at the discretion of CPS;

3. Conduct exploratory work to define the extent of the deposit beyond the current resource/reserve area; and

4. Ongoing environmental management planning, permitting, and social and local community engagement.

The authors perception is that the work objectives are complementary to one another, and therefore, a unified work approach is recommended. The collective estimated cost of the 2020 work recommendations, including a 10% contingency, is CDN$1,859,000. Additional detail on the work recommendations and cost breakdown is provided in the text that follows and Table 26.1.

26.1 Upgrading Current Resource/Reserve Classification Levels

It is recommended that CPS conduct sonic and auger drill programs and surface trenching to improve geology/resource certainty and, in particular, to better delineate the shallow subsurface waste material in preparation of the mine plan. A combination of deeper sonic drillholes and shallower auger holes is recommended as follows:

- The sonic drillhole program should drill and sample through the entire Winnipeg Formation to the Precambrian basement in those areas of the resource area and mine plan that may require better resource delineation. This program will allow, for example, the mining team to better delineate the upper and lower surfaces of the Black Shale unit for stripping during the mine process.

- The auger drillholes and trenching should be used to map and evaluate the Pleistocene glaciofluvial surficial deposits ahead of the mine plan for the potential inclusion of sand from this geo-unit in the silica sand processing plants.

- In surficial deposit areas with silica sand potential, a bulk trench and/or auger sample is recommended. This sample can be trial tested in any future processing plants at the Wanipigow Property; either as isolated Pgf material or blended together with LBI/UBI silica sand.

The authors estimate an infill drill program of approximately 750 m. Deeper sonic drilling should be completed through to the Precambrian basement, or a total depth of approximately 15-20 m. Shallower auger holes should penetrate through the entire Pgf geo-unit (up to 24 m thick as shown in CPS's 2018 drill program). The total cost of the infill drill program within the current resource area is estimated at CDN$350,000.

Further work is required to advance the geological understanding and confidence level of the Pleistocene glaciofluvial surficial deposits. In addition to the auger drilling and trenching program, the authors recommend CPS consider surficial mapping and geophysical surveying approaches such as gamma, resistivity and/or ground-penetrating radar surveys.

Sand-rich portions of the Pgf can be composed of compositionally mature, quartz-rich sand. In contrast, till and glaciolacustrine surficial deposits are generally poor in sand with significantly higher proportions of clay minerals. Lastly, the variation between various glacio-lithologies can be high sporadic in the surficial depositional environment and difficult to map in detail and with confidence.

The authors recommend, therefore, that surficial mapping together with Ground Penetrating Radar (GPR), Ohm-Mapper resistivity surveys and/or downhole gamma and resistivity surveys be considered to define and characterize the subsurface geo-units at the Wanipigow Sand Project. The surficial mapping, and GPR and Ohm-Mapper surveys would be used to delineate the uppermost surficial deposits (Pgf) and potentially UBI geo-unit. The downhole geophysical surveys can be used to map the entire geological column.

Geophysical techniques are not predictable in any given environment and a preliminary survey is recommended to test the effectiveness of various instruments and techniques at the Wanipigow Property. The estimated cost to test these techniques is estimated at CDN$70,000. If successful a full Property survey can be conducted, or CPS may wish to run the surveys in consideration of only the current mine-plan.

Table 26.1 Future recommendations for the Wanipigow Sand Project.

Objective	Item	Description	Cost Estimate CDN$	Cost Estimate USD$
Upgrading current resource/reserve classification levels	Infill and geotechnical drilling within the current resource area	Approximate 750 m sonic and auger drill programs to improve geology/resource certainty and to better delineate waste material	$350,000	$262,500
	Surficial mapping and electrical/radar surveys	Surficial mapping, downhole wireline logging and/or Ground Penetrating Radar geophysical surveying to better characterize the shallow and deep subsurface geo-units, respectively (with an emphasis on defining the lithology of the Pgf sub-unit)	$70,000	$52,500
	Proppant characterization test work	Ongoing test work conducted at an independent ISO 13503-2 certified laboratory to further evaluate Winnipeg Formation sand quality	$40,000	$30,000
Feasibility level of mine-planning design and costing accuracy	Detailed mine planning	Detailed mine design/plan; dewatering plan; productivity analysis; and operating costs estimates built from ground up on yearly basis over life-of-mine	$330,000	$330,000
	Product distribution	Further initiatives pertaining to rail served product storage and distribution terminals		
	Technical Reporting	Feasibility Study Technical Report		
	Groundwater monitoring	Ongoing hydrogeological studies and pump tests to assess groundwater conditions	$150,000	$112,500
Definition of deposit extent	Exploratory drilling on the Property outside the current resource area	Approximatel 900 m sonic drill program to delineate other resource areas at the Wanipigow Property	$525,000	$393,750
Environmental, permitting and community engagement	Environmental-planning and continuned community consultation	Development of a Closure Plan, environmental plans, permitting, andcontinued social and local community engagement	$225,000	$168,750
	Contingency on exploration work (10%)		$169,000	$126,750
		TOTAL ESTIMATED COST	**$1,859,000**	**$1,476,750**

Currency converted using a conversion of 1 CDN dollar equals 0.75 USD dollar.

CPS should continue to evaluate the quality of silica sand at the Wanipigow Sand Project. During 2020, it is recommended that CPS run additional proppant characterization tests that include:

- Additional test work on UBI samples from the current resource area to provide further support that the UBI samples tested in the current exploration work (n=9 fractions; Tables 13.4 and 13.8) are equivalent or of better quality than the LBI samples (n=204 fractions; Tables 13.3 and 13.8); and

- New sample material from all sand-based geo-units associated with exploratory phases outside of the current resource area.

The test work must be conducted at an independent ISO 13503-2 certified laboratory. The estimated cost of the proppant characterization work as outlined is CDN$40,000.

26.2 Feasibility level of mine-planning design and costing accuracy

The authors recommend that the project progress to the Feasibility Level. Mining-related feasibility work would include: detailed mine design/plan; dewatering plan; productivity analysis; and operating costs estimates built from ground up on yearly basis over life-of-mine. At this level, additional design and cost details of the process plant and loadout would be compiled. An expansion of the existing mining plan scheduling the sequencing of overburden removal and placement, ROM sand removal, and ongoing reclamation should be included. Haul road placement and grade, traffic flow arrangements, and a detailed and scaled site plan should be finalized. A daily operating plan narrative outlining the maintenance tracking, safety, and product quality assurance and testing programs should be included.

From a product distribution perspective, rail served product storage and distribution terminals within the target markets should be located and discussions regarding securing product unloading, storage, and truck loading should be initiated.

The estimated cost of the feasibility work, including a Feasibility Technical Report, is estimated at CDN$330,000.

In addition to the feasibility work, but related to mine-planning, CPS should continue to monitor groundwater aquifer(s) underlying the Wanipigow Property. The hydrogeological studies will enable CPS to temporally monitor the groundwater table and hydrogeological conditions at the Wanipigow Property. The groundwater monitoring holes are typically constructed by drilling enlarged (upper) and reduced (lower) hole diameters of 12” and 8” (30 and 20 cm), respectively, and then securing access to the well with 8” (20 cm) steel pipe casing and screens. The monitoring holes are measured regularly (once a month) to record the depth to the groundwater table. The cost of preparing the groundwater monitoring wells and/or continued monitoring of the wells associated with ongoing hydrogeological studies is estimated at CDN$150,000.

26.3 Definition of Deposit Extent

CPS's 2018 exploration drill program successfully drilled, sampled and tested the Winnipeg Formation and Pleistocene glaciofluvial with a 94% recovery rate. The resource area is approximately 10.11 km^2, which represents roughly 50% of the current spatial extent of the entire Wanipigow Property (22.89 km^2).

Accordingly, the authors recommend that CPS continue to explore for silica sand outside the resource area once these quarry leases are approved by the GoM (see Section 4.1). A 900 m sonic drillhole program is recommended using the same drilling protocols established during CPS's 2018 exploration work. For example, the drilling should penetrate through the entire Winnipeg Formation to the Precambrian basement.

A recommended change to the sampling program is that the geological team sample the entire intersection of core regardless of sand content such that there are no non-sample intersections when it comes time to constructing the resource 3-D model and during future resource estimation phases. The total cost of the exploratory drill program is estimated at CDN$525,000. This cost incudes gradation analytical work on all samples.

26.4 Environmental, permitting and community engagement

Continued mine development logistical costs should include: ongoing monitoring of the groundwater conditions at the Wanipigow Sand Project; preparation of a Closure Plan and environmental plans; finalize permitting and licencing; and ongoing social and local community consultation. The cost of these ongoing activities is estimated to cost approximately CDN$225,000.

To end, the decision to put a mineral project into production is the responsibility of the issuer. To reduce this risk and uncertainty, the issuer typically makes its production decision based on a comprehensive Feasibility Study of established mineral reserves. Given this positive Preliminary Feasibility Study of an industrial mineral commodity, it is important to point out that some of the recommendations (e.g., exploratory work beyond the current resource area and/or completion of a formal Feasibility Study in conformance with NI 43-101 and 43-101 CP) are ultimately not required for a production decision. The ultimate demonstration of the economic viability of an industrial mineral deposit may be satisfied by actual profitable production as a function of market conditions such as product specification and demand. If CPS puts the Wanipigow Sand Project into production, and to avoid making misleading disclosure, it is recommended that the issuer discloses that the Company has not based its production decision on a Feasibility Study of mineral reserves demonstrating economic and technical viability and should provide adequate disclosure of the increased uncertainty and the specific economic and technical risks of failure associated with its production decision.

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28 Certificate of Authors

I, D. Roy Eccles, P. Geol., do hereby certify that:

1. I am a Senior Consulting Geologist and Chief Operations Officer of APEX Geoscience Ltd., Suite 110, 8429 – 24th Street, Edmonton, Alberta T6P 1L3.
2. I graduated with a B.Sc. in Geology from the University of Manitoba in Winnipeg, Manitoba in 1986 and with a M.Sc. in Geology from the University of Alberta in Edmonton, Alberta in 2004.
3. I am and have been registered as a Professional Geologist with the Association of Professional Engineers and Geoscientists (APEGA) of Alberta since 2003.
4. I have worked as a geologist for more than 30 years since my graduation from University and have been involved in all aspects of mineral exploration, mineral research and mineral resource estimations for metallic, industrial, specialty and rare-earth element mineral projects and deposits in Canada. I have explored for and prepared mineral resource estimates for silica sand projects in western Canada and northeastern United States.
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6. I am responsible for and have supervised the overall preparation of the "*NI 43-101 Technical Report, Updated 2020 Preliminary Feasibility Study on Canadian Premium Sand Inc.'s Wanipigow Silica Sand Deposit in Manitoba, Canada"*, with an effective date of 19 March 2020 (the Technical Report). Specifically, I prepared the geological and summary components of this report including Sections 1-14, 20 and 23-27. I visited the Wanipigow Sand Project and Property on March 4-6th 2019 and can verify the Property infrastructure and silica sand mineralization.
7. To the best of my knowledge, information and belief, the Technical Report contains all relevant scientific and technical information that is required to be disclosed, to make the Technical Report not misleading.
8. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
9. I am independent of the issuer, the vendor and the Property and successfully pass the independency requirements of the Guidance of Independence test in NI 43-101 CP Item 1.5.
10. I have not had any prior involvement with the Property that is the subject of the Technical Report.
11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files or their websites.

Effective date: 19 March 2020
Signing Date: 19 March 2020
Edmonton, Alberta, Canada

PROFESSIONAL GEOLOGIST D. ROY ECCLES ALBERTA

PERMIT TO PRACTICE
APEX GEOSCIENCE LTD.
RM SIGNATURE:
RM APEGA ID #: 74150
DATE: 19 MAR 2020
PERMIT NUMBER: P005824
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

D. Roy Eccles, M.Sc., P. Geol.

I, Robert J. Farmer, P. Eng., do hereby certify that:

1. I am a Vice President of John T. Boyd Company, 4000 Town Center Boulevard, Suite 300 Canonsburg, PA, United States 15317.
2. I graduated in 1994 with a B.Sc. in Mining Engineering from Queen's University, Kingston, Ontario.
3. I am and have been registered with Professional Engineers Ontario since 2000 and with the Professional Engineers & Geoscientists Newfoundland and Labrador since 2017. I am and have been a Registered Member of the Society for Mining, Metallurgy, and Exploration (SME) since 2007.
4. I have worked as a Mining Engineer for more than 25 years since my graduation from University and have extensive knowledge of computerized geologic modeling, mineral resource and reserve estimation, underground and surface mine design and operations, production scheduling, and financial modeling. Deposit and mine commodity expertise include coal, industrial minerals, base metals and gold.
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Items 15-18 of the "*NI 43-101 Technical Report, Updated 2020 Preliminary Feasibility Study on Canadian Premium Sand Inc.'s Wanipigow Silica Sand Deposit in Manitoba, Canada"*, with an effective date of 19 March 2020 (the Technical Report). I visited the Wanipigow Sand Project and Property on March 4-6th 2019 and can verify the Property infrastructure and silica sand mineralization.
7. To the best of my knowledge, information and belief, the Technical Report contains all relevant scientific and technical information that is required to be disclosed, to make the Technical Report not misleading.
8. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
9. I am independent of the issuer, the vendor and the Property and successfully pass the independency requirements of the Guidance of Independence test in NI 43-101 CP Item 1.5.
10. I have not had any prior involvement with the Property that is the subject of the Technical Report.
11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files or their websites.

Effective Date: 19 March 2020
Signing Date: 19 March 2020
Edmonton, Alberta, Canada

Robert J. Farmer, B.Sc., P. Eng.

I, Michael F. Wick, PE, do hereby certify that:

1. I am a Vice President of John T. Boyd Company, 4000 Town Center Boulevard, Suite 300 Canonsburg, PA, United States 15317.
2. I graduated in 1984 with a B.Sc. in Mining Engineering from The Pennsylvania State University, University Park, PA and a Master of Business Administration in 1999 from Lincoln Memorial University, Harrogate, TN.
3. I am and have been a registered Professional Engineer in the State of Pennsylvania since 1990. I am and have been a Registered Member of the Society for Mining, Metallurgy, and Exploration (SME) since 2012.
4. I have worked as a Mining Engineer for more than 33 years since my graduation from college and have extensive knowledge of mineral resource and reserve estimation, greenfield project development pertaining to industrial minerals, production scheduling and capital/operating cost review, and financial modeling. The majority of my experience has been with operating companies in the mining segment.
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6. I am responsible for the preparation of Items 19, 21, and 22 of the "*NI 43-101 Technical Report, Updated 2020 Preliminary Feasibility Study on Canadian Premium Sand Inc.'s Wanipigow Silica Sand Deposit in Manitoba, Canada"*, with an effective date of 19 March 2020 (the Technical Report). I visited the Wanipigow Sand Project and Property on March 4-6th 2019 and can verify the Property infrastructure and silica sand mineralization.
7. To the best of my knowledge, information and belief, the Technical Report contains all relevant scientific and technical information that is required to be disclosed, to make the Technical Report not misleading.
8. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
9. I am independent of the issuer, the vendor and the Property and successfully pass the independency requirements of the Guidance of Independence test in NI 43-101 CP Item 1.5.
10. I have not had any prior involvement with the Property that is the subject of the Technical Report.
11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files or their websites.

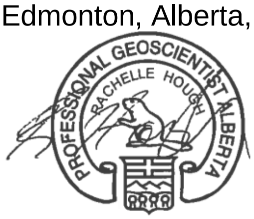
Effective Date: 19 March 2020
Signing Date: 19 March 2020
Edmonton, Alberta, Canada

Michael F. Wick, MBA, PE.

I, Rachelle Hough, P. Geo., do hereby certify that:

1. I am currently employed as a Geologist with APEX Geoscience Ltd., 110, 8429-24 Street, Edmonton, Alberta T6P 1L3.
2. I graduated with a Bachelor of Applied Science (BSc.) in Geology, received from the University of Alberta in 2008.
3. I am and have been registered as a Professional Geologist with the Association of Professional Engineers and Geoscientists (APEGA) of Alberta since 2012.
4. I have worked as a geologist for 11 years since my graduation from university.
5. I have read the definition of Qualified Person set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6. Under the direction of Mr. Eccles, I contributed to Sections 2-14 and 23 of the "*NI 43-101 Technical Report, Updated 2020 Preliminary Feasibility Study on Canadian Premium Sand Inc.'s Wanipigow Silica Sand Deposit in Manitoba, Canada"*, with an effective date of 19 March 2020 (the Technical Report). I provided independent geological consulting during the Company's 2018 drill program and last visited the Wanipigow Sand Project and Property on March 4-6th 2019. I can verify the authenticity of the 2018 drill program and associated sampling protocols, along with Property infrastructure and silica sand mineralization.
7. I am not aware of any scientific or technical information with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.
8. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
9. I am independent of the issuer, the vendor and the Property and successfully pass the independency requirements of the Guidance of Independence test in NI 43-101 CP Item 1.5.
10. I have not had any prior involvement with the Property that is the subject of the Technical Report.
11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files or their websites.

Effective Date: 19 March 2020
Signing Date: 19 March 2020
Edmonton, Alberta, Canada



Rachelle Hough, BSc., P. Geo.