

## Bankable Feasibility Study confirms Superior Lake as a High Margin Asset

Superior Lake Resources Limited (ASX: SUP) (“Superior Lake” or the “Company”) is pleased to announce the results of its Bankable Feasibility Study (“BFS” or “Study”) for the Superior Lake Project (“Project”) in Ontario, Canada. The Study incorporates the Company’s maiden Ore Reserve (ASX announcement 28 August 2019) and the results of extensive investigations and feasibility work carried out by the Company since it acquired the asset in 2018.

### General Highlights (see page 3 for detailed highlights)

- Excellent project economics
- Mining is predominantly derived from the Pick Lake Ore Reserve
  - 93% Ore Reserve and 7% Inferred Resources
- Geophysical anomalies provide exploration upside with potential for extensions to mine life
- Project development enhanced by significant existing infrastructure from previous mining and processing operations
- Continued progress with project finance process

Image 1: Existing infrastructure at Superior Lake Project



## CAUTIONARY STATEMENT

*As the Bankable Feasibility Study for the Project utilises a portion of Inferred Resources, the ASX Listing Rules require a cautionary statement be included in this announcement.*

*The BFS referred to in this announcement is based upon a JORC Compliant Mineral Resource Estimate (see ASX announcement 7<sup>th</sup> March 2019)<sup>1</sup>, inclusive of the maiden Probable Ore Reserve (see ASX announcement 28<sup>th</sup> August 2019<sup>2</sup>).*

*The Company advises that the Probable Ore Reserve is based on Indicated material only, which makes up 93% of the total mined tonnage (7% Inferred material) and 90% of the total contained zinc metal (10% Inferred).*

*There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the conversion of Inferred Mineral Resources to Indicated or Measured Mineral Resources or that the production targets or forecast financial information reported in this announcement will be realised.*

*The Probable Ore Reserve that underpins the BFS has been prepared by a Competent Person, with a Competent Person's Statement included in this announcement and in the Ore Reserve announcement also released today.*

*The Company has concluded that it has a reasonable basis for providing the forward-looking statements included in this announcement. The detailed reasons for this conclusion are outlined throughout this announcement.*

---

<sup>1</sup> Superior Lake confirms that it is not aware of any new information or data that materially affects the information included in the announcement of 7 March 2019 and that all material assumptions and technical parameters underpinning the Mineral Resource estimate in the announcement of 7 March 2019 continue to apply and have not materially changed.

<sup>2</sup> Superior Lake confirms that it is not aware of any new information or data that materially affects the information included in the announcement of 28 August 2019 and that all material assumptions and technical parameters underpinning the Ore Reserve estimate in the announcement of 28 August 2019 continue to apply and have not materially changed.



## Detailed Highlights

---

- **Bankable Feasibility Study (BFS) results demonstrate a highly economic and robust Project:**
    - C1 Cost – US\$ 0.35/lb Zn
    - AISC Cost – US\$ 0.47/ lb Zn
    - NPV<sub>8</sub> pre-tax US\$157M (A\$224M)
    - IRR 31% (pre-tax)
  - **Key Feasibility Study results include:**
    - EBITDA at full production – US\$59M pa
    - Life of Mine average EBITDA of US\$36M (A\$50M) per annum
    - Initial capital expenditure of US\$86M (A\$106M) excluding owners and pre-production
    - Life of Mine of 9 years
    - Annual production (after ramp-up) of 38ktpa contained Zinc and 1.4ktpa contained Copper
  - **Key production figures:**
    - Plant throughput 325,000 tonnes per annum
    - Total 2.2 million tonnes treated
    - Average grade: 13.7% Zn
    - Average zinc recovery: 96%
- 

### David Woodall, CEO of Superior Lake, commented:

*"The purpose of this BFS was to validate Superior Lake becoming a viable zinc operation. This was clearly achieved, as the Study demonstrates the Project will generate strong cash flow throughout the nine-year mine life. The driving factor for the result was the low AISC (LOM - US\$0.47 / lb), which, if brought into production, would rank the Project in the lowest quartile of producers globally.*

*"The development of the Project has been completed with the future in mind, as the decline will be in close proximity to each of the major geophysical anomalies that were identified in the 2019 exploration program, all of which are expected to be tested in the near future. A discovery at any of these anomalies would significantly change the parameters of the Project both in terms of mine life as well as production profile. In the coming months, the Company will focus on finalising off-take, equity and debt financing as well as completing an Optimisation Study whereupon a decision to mine will be made."*

## PROJECT BACKGROUND

The property was discovered by prospectors in 1879 with high-grade zinc ore discovered in the Zenith Lake area, which is adjacent to Winston Lake. Development on the site of the Zenith deposit commenced in 1900 and by the end of 1901 some 2,700 tonnes were mined. Between the late 1960s and early 1970s an additional 165,000 tonnes at 16.5% Zn of ore was mined before operations ceased. In 1986 the development of the Winston Lake Mine was commenced by Inmet Mining Limited ("**Inmet**") (subsequently acquired by First Quantum Minerals Limited ("**First Quantum**") with 3.4 million tonnes grading 1.0% copper and 16% zinc processed.

The development of the Winston Lake Mine included a 1,000tpd mill (three-stage crushing circuit followed by a two-stage milling circuit) which produced approximately 900Mlbs of zinc, 53Mlbs of copper and over 50,000 ounces of gold at reported recoveries of 93% (zinc) and 78% (copper). Historical mining methods included mechanised cut and fill, AVOCA and Alimak. Towards the end of the mine operations, a test stope was successfully completed at the Pick deposit using sub-level longhole stoping.

Operations continued for 11 years with production from the Pick deposit adding to the ore feed from 1995 until operations were suspended in December 1998. The operation was finally closed in February 1999 due to a very low zinc price at the time (US\$0.42/lb).

Historical zinc concentrate grades were between 52% and 53.5% zinc and copper concentrates ranged from 22% to 25% copper. The historic gold and silver grades in the copper concentrate were around 11g/t gold and 310g/t silver. Concentrates were considered high quality, free of deleterious elements and with low impurities of critical elements such as arsenic, antimony and mercury.

A Restart Study was completed by the Company in October 2018 ("**Restart Study**"). The Restart Study included:

- Delivery of the Maiden JORC compliant Mineral Resource Estimate for project
- A mining scoping study (by Mining Plus)
- A preliminary engineering study (by Nordmin Engineering) consisting of
  - A dewatering strategy for the mine, including cost and schedule estimates
  - A high-level cost estimate to re-equip the mine in preparation for start-up
  - A high-level cost estimate for the installation of a new concentrator and infrastructure
- A review of the permitting and licensing requirements for the development and start-up of the mines

The Restart Study completed demonstrated a viable project based on a production rate of 1,000 tonnes per day delivering a steady state metal production of 46,000 tonnes zinc and 1,700 tonnes copper. Capital costs (direct, indirect and deferred) were in the order of US\$82M and operating costs (AISC) of USD\$ 0.51/lb Zn.

## Study Parameters

- JORC Compliant Mineral Resource
- JORC Compliant Ore Reserve
- Processing Plant and associated infrastructure is constructed under an Engineering, Procurement and Construction Management (EPCM) model
- 15-month construction phase followed by a 9-year underground mining operation for a total Project life of 10 years
- Owner-operator underground mining
- Project implementation by Superior Lake's Owner's Team with EPCM contractor support



The BFS assumes a plant throughput of 325,000 tonnes per annum with a total mine life of 9 years and a total throughput of 2.2 Mt of ore at a grade of 13.7% Zn.

The BFS calculates the NPVs and IRR as at the decision to mine.

### Study Team

The key inputs to this BFS were delivered by Australian based project engineers Primero Group Ltd who undertook plant design and operating cost and capital expenditure estimation and incorporated technical aspects from:

- Massa Geoservices Ltd for the Mineral Resource estimate;
- Orelogy Consulting Pty Ltd for mine planning and Ore Reserves;
- Mine Design Engineering Inc. for underground geotechnical;
- Nordmin Engineering Ltd for mine and general site infrastructure
- SGS Canada Inc. for metallurgical test work;
- Wood Canada Ltd for tailings and water studies; and
- Environmental Applications Group Inc. for environmental and permitting.

## THE SUPERIOR LAKE BFS IN SUMMARY

### Project Economics

The cashflow modelling of the Project demonstrates highly positive financial returns. The modelling is based upon 100% ownership<sup>3</sup>, no debt, 9-year life of mine, long-term pricing, and the Orelogy, Primero, Nordmin and Wood supplied capital and operating costs (as set out further below).

The key financial results are:

**Table 1: Project Financial Summary**

Criteria	Value
NPV <sub>8</sub> (pre-tax)	US\$158M
NPV <sub>8</sub> (post-tax)	US\$115M
IRR (pre-tax)	31%
IRR (post-tax)	27%
EBITDA/annum (average LOM)	US\$34M
Initial Capital Cost	US\$87M
Owner's and Pre-production	US\$10M
Production (average LOM)	32ktpa contained Zn
Zinc pricing (long-term)	US\$1.22/lb Zn
C1 Operating Cost (average LOM)	US\$0.35/lb Zn
AISC Cost (average LOM)	US\$ 0.46/lb Zn
LOM	9 Years

### Capital Costs

The construction capital required for mine development, inclusive of the decline to access the Pick ore, a 325,000tpa plant and associated infrastructure is estimated to be US\$87M (excluding owner's costs and pre-production). This includes a 9.5% overall contingency and is based on the following:

- Owner Operator mining for the mine development
- SAG milling
- Two-stage flotation (copper and zinc)
- Concentrate filtration and loading into seatainers
- Use of existing transmission line to site (115kV)
- Use of existing, upgraded site access road
- Use of existing tailing storage facility (TSF)
- Upgrades to surface water infrastructure and water treatment plant

The capital cost is based upon an estimate date of Q2 2019 with an accuracy of -10% +15%. The breakdown of the capital cost estimate is shown below:

<sup>3</sup> The Company currently holds 70% of the Superior Lake Zinc Project and has entered into binding agreements to acquire up to an additional 15%, which if approved by shareholders, will increase the Company's interest in the Project to 85% (see ASX announcement 1<sup>st</sup> May 2019).

**Table 2: Project Capital Cost Estimate**

Cost Centre	US\$M
Site General	0.8
Process Plant	43.5
Infrastructure	7.5
Mine Development	13.2
<b>sub-total Direct Capital Costs</b>	<b>65.1</b>
EPCM / Management	5.4
Construction Indirects	7.7
<b>sub-total Indirect Capital Costs</b>	<b>13.1</b>
Contingency	<b>8.6</b>
<b>Total</b>	<b>86.7</b>

Pre-production costs and Owner's costs are shown in Table 3 below.

**Table 3: Project Owner's Pre-Production Cost Estimate**

Cost Centre	(US\$M)
Owner's Costs	1.8
Mining Pre-production	5.0
Plant Pre-production	3.6
<b>Total</b>	<b>10.5</b>

A life of mine sustaining capital amount of US\$43M (average US\$5.1M per annum) has also been included in the discounted cash flow model.

## Operating Costs

Operating costs are presented in Table 4 below and assume a mine delivery of 1,000tpd ore, an average of 725tpd waste material and a 325,000tpa processing plant with grid power producing individual copper and zinc concentrates. The operating cost is based upon an estimate date of Q2 2019 with an accuracy of -10% +15%, no contingency allowance has been assumed.

**Table 4: Project Operating Cost Estimate<sup>4</sup>**

Cost Centre	US\$M / year	US\$/t ore	US\$/lb Zn
Mining	17.5	53.28	0.16
Labour (excl. mine personal)	5.5	16.92	0.05
Operating consumables	4.0	12.34	0.04
Power	1.8	5.37	0.02
Maintenance material	1.0	3.18	0.01
General and Administration	2.8	8.58	0.03
<b>Total</b>	<b>32.6</b>	<b>99.66</b>	<b>0.30</b>

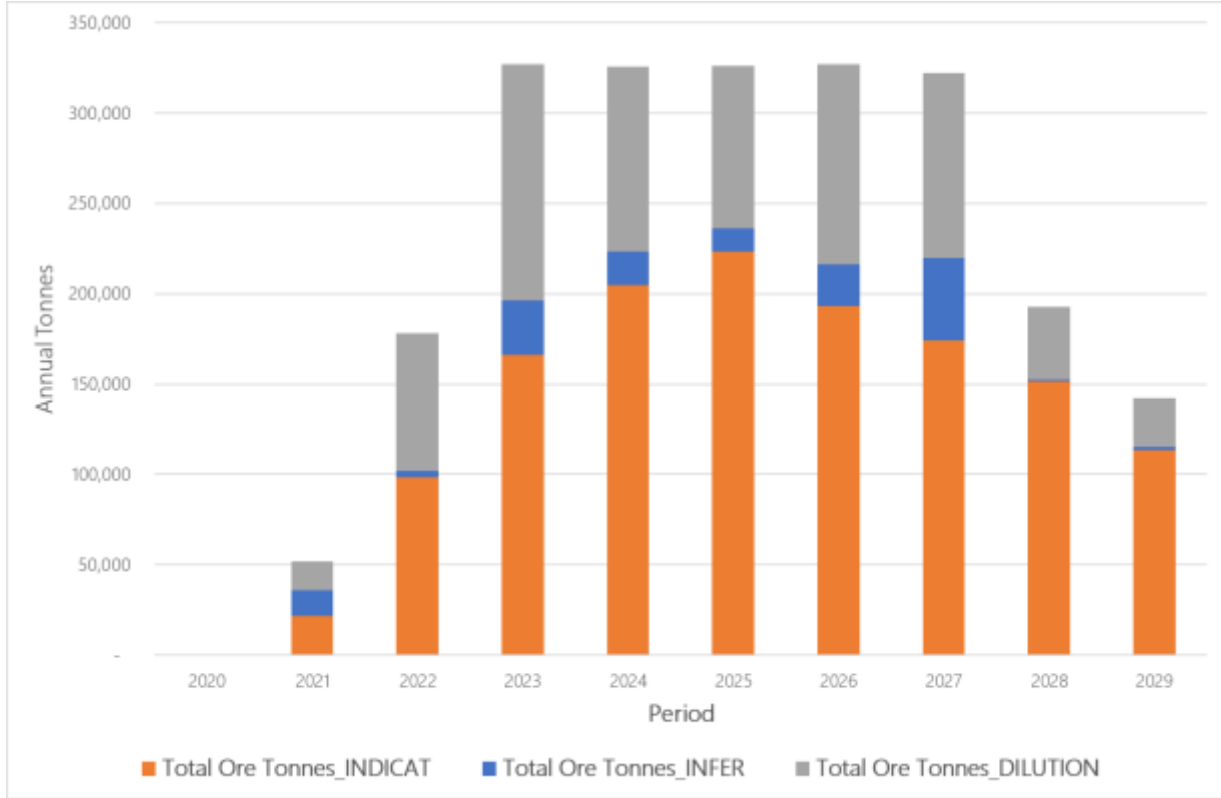
## Production Profile

The BFS is based upon an underground mine access via a decline from surface providing 1,000tpd mill feed (325,000tpa) for the 9-year life of mine. The 325,000tpa production rate equates to approximately 73,000tpa zinc concentrate and 5,200tpa copper concentrate.

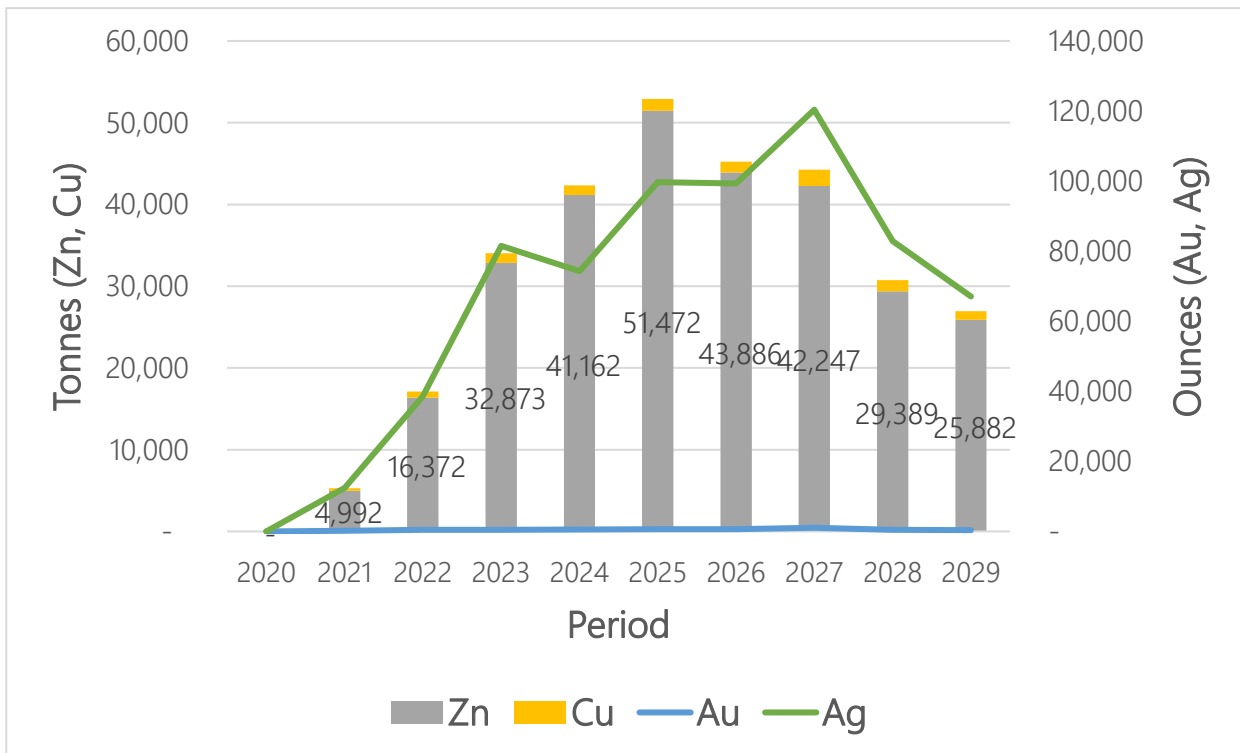
The production schedule was initially developed to only target the Indicated Resources, which were used for the Ore Reserve determination, with Inferred Resources added as additional tonnes where it correlated

<sup>4</sup> Based on Steady State production numbers as referenced in Process Design Criteria

with the Indicated Resources. Over the modelled 9 years, the Project utilises 2.0 Mt of Indicated Resources (93%) and 0.2 Mt of Inferred Resources (7%).



**Image 2: Annual Production Tonnes by Resource Category**



**Image 3: Annual Metal in Concentrates**



## Mineral Resource

The Project Mineral Resource estimates were prepared by independent resource consultant MASSA Geoservices as part of the BFS and were reported in accordance with JORC (2012) guidelines. The Project Mineral Resource is summarised below with an effective date of 7<sup>th</sup> March 2019 (see footnote 1, page 2).

**Table 5: Mineral Resource Estimate<sup>1</sup>**

Superior Lake Mineral Resource at 3% Zn cut-off grade					
Classification	Tonnage Mt	Zn%	Cu%	Au g/t	Ag g/t
Indicated	2.07	18.0	0.9	0.4	34
Inferred	0.28	16.2	1.0	0.3	37
<b>Total</b>	<b>2.35</b>	<b>17.7</b>	<b>0.9</b>	<b>0.4</b>	<b>34</b>

1. Mineral Resources are inclusive of Ore Reserves. The Mineral Resource was estimated within constraining wireframe solids using a nominal 3% zinc cut-off grade. The resource is quoted from all classified blocks within these wireframe solids. Differences may occur due to rounding.

## Ore Reserve

The Project Ore Reserve estimates were prepared by independent mining consultant Orelogy Consulting Pty Ltd and were reported in accordance with JORC (2012) guidelines. The Project Ore Reserves are summarised in Table 6 below.

**Table 6: Ore Reserve Estimate\***

Superior Lake Ore Reserve					
Classification	Tonnage Mt	Zn%	Cu%	Au g/t	Ag g/t
Probable	1.96	13.9	0.6	0.2	26.2
<b>Total</b>	<b>1.96</b>	<b>13.9</b>	<b>0.6</b>	<b>0.2</b>	<b>26.2</b>

\* Ore Reserves were estimated only on the Indicated portion of the Mineral Resource Estimate. The average cut-off grade applied was 5.2% Zn. The Ore Reserve was achieved by creating a mining block model from the resource model and the detailed mine design and mine scheduling. The mining schedule includes mining loss, with a calculated average mine dilution of 31% incorporated in the model. The Ore Reserves have been classified as Probable based on guidelines specified in JORC Code (2012).

## Mining

The Project considered two options for the mine development; the first being the re-establishment of the shaft system and the second option being a ramp developed from the surface to the upper resources of the Pick deposit. The work completed showed the ramp from the surface is the preferred option based on shorter time to first ore and reduced risk for the project.

The mining production schedule proposed is therefore based on the decline ramp option developed from surface, adjacent to the historical Zenmac workings across to upper Pick and a hanging wall ramp developed to access the Pick resources (see Image 4).





The processing flow sheet consists of the following stages:

- Single stage crushing of ROM ore
- Single-stage milling (SAG)
- Copper conditioning and flotation (with regrind of rougher concentrate)
- Zinc conditioning and flotation (with regrind of rougher concentrate)
- Concentrate dewatering and filtration
- Product loading into seatainers

The process is similar to the plant that was previously installed on the site with the exception of the SAG mill replacing the rod and ball mill previously used. The SAG mill provides some benefits with regard to reduced amount of equipment and lower costs generally, without comprising performance.

The plant has been sized initially for 325,000tpa mill feed, but designed to allow for a doubling of throughput by duplicating the main equipment, which can be relatively easily undertaken.

## Infrastructure

The Project has excellent existing infrastructure including:

- Access road
- 115kV transmission line to site
- Tailings Storage Facility (TSF)
- Freshwater dam
- Water treatment plant
- Mine shaft at Winston
- Approximately 1.6km of underground workings, including two ventilation raises into Pick workings
- Cleared site where the plant and associated infrastructure can be located

The region is a well-developed historical mining area with multiple operating mines located within the area. Thunder Bay is a significant town, less than 200km away, with excellent facilities including engineering workshops, various service providers, Lakehead University and medical facilities.

## Next Steps

With the BFS having demonstrated that Superior Lake a highly economic Project, in the coming months, the Company is focused on finalising debt and equity finance and completing a value engineering component (Optimisation Study) and then move to a decision to mine, detailed design and construction. The key activities for the next six months are:

- Finalising off-take agreements with selected parties
- Securing debt financing
- Value engineering to look at cost reduction opportunities
- Delivering of an Optimisation Study incorporating the above
- Completing the environmental licensing (Closure Plan) process
- Securing permits required for construction
- Finalising agreements with First Nations groups



## DETAILED BFS ASSESSMENT

### Introduction

Superior Lake Resources Limited (Superior Lake or the Company) is a zinc exploration and development company focused on developing the Superior Lake Zinc Project in Ontario, Canada (Superior Lake Project or the Project). The Project consists of the Pick Lake Deposit and the Winston Lake Deposit.

The Project is owned by Ophiolite Holdings Pty Ltd ("**Ophiolite**"), an Australian incorporated entity. Superior Lake owns 70% of Ophiolite and has recently announced transactions to acquire an additional interest of 15% in Ophiolite (see footnote 2, page 6).

Since acquiring an interest in the Project, the Company has updated the historic resource to JORC (2012) compliance, completed a Restart Study (see ASX announcement 10<sup>th</sup> October 2018) which demonstrated strong economics and attractive capital payback and undertaken an exploration program that has added to the resource and identified a number of targets for future drilling.

This Bankable Feasibility Study (BFS) has been based broadly on the results of the Restart Study with the exception being the mine access via a new decline from surface instead of rehabilitating the old Winston shaft. The numbers are based on a 1,000 tpd operation, with a total upfront capital cost of US\$87m (plus US\$10M pre-production and Owner's costs). Assuming a zinc price of US\$2,690 per tonne, the Project is expected to generate average LOM annual EBITDA of US\$34M and have a pre-tax NPV<sub>8</sub> of US\$158M and IRR of 31%. Should the Project commence operations consistent with the parameters of the BFS, a forecast average operating cost of US\$0.35/lb and all in sustaining cost of US\$0.46/lb, would place the Project in the lowest quartile of the cost curve for zinc producers (based on S&P Global market data).

Superior Lake is expected to produce over LOM an average of 32ktpa of zinc concentrate and 5.2ktpa of copper concentrate. Subject to successful completion of the key activities set out in the previous page, production is expected to commence in 2021 for a mine life of 9 years. There are also several advanced exploration targets that present an opportunity for a potential extension to the mine life.

The Company has previously reported an initial brownfields exploration target ranging from 2.1 to 5.2 million tonnes at a grade between 13.3% and 15.4% Zn (see ASX announcement 26 September 2018). This brownfields target consists of extensions to known mineralisation and the new targets defined in the immediate vicinity of the existing JORC resource. It does not include the significant greenfields exploration potential which exists within the broader Project area. Superior Lake confirms that it is not aware of any new information or data that materially affects the information included in the announcement of 26 September 2018. The potential quantity and grade of the Exploration target is conceptual in nature and therefore is an approximation. There has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in estimation of a Mineral Resource.

### Project Description and Tenements

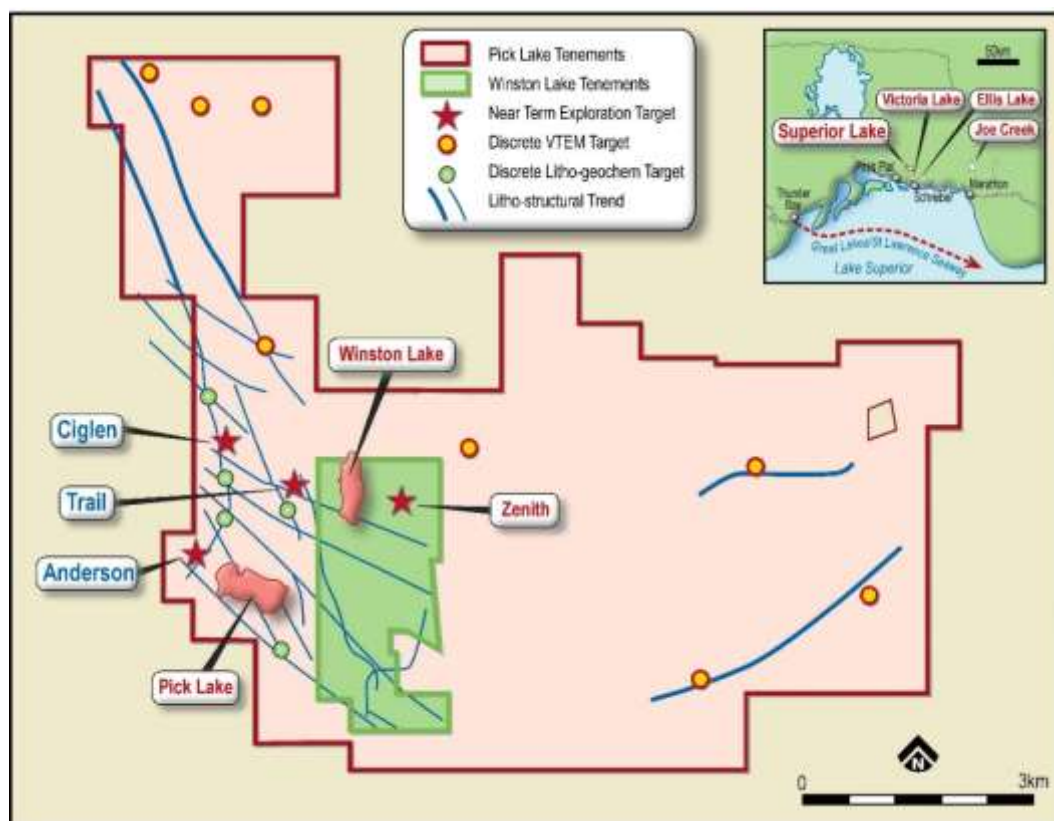
The Project is located in north-western Ontario, Canada and is accessed via a well-maintained 20km unpaved road from the TransCanada Highway (Images 5 and 6). It comprises the previously mined Pick and Winston Lake deposits and infrastructure including a 115kV powerline, a tailings management facility (TMF or TSF), freshwater dam, two vertical shafts and other underground development associated with the Winston Lake Mine. The brownfields nature of the development results in significant capital and permitting benefits. In addition, the 11-year operational history under Inmet / First Quantum ownership provides significant confidence in relation to resource reconciliation, metallurgical performance, mining conditions and cost profile.





**Image 5: Project Location**

The Project consists of a single contiguous group of claims consisting of 81 mining claims covering 175 square kilometres (km<sup>2</sup>). The tenements are all in good standing.



**Image 6: Superior Lake Tenements**





## Project Ownership

As noted, the Project is owned by Ophiolite. Superior Lake owns 70% of Ophiolite and has recently announced transactions to acquire up to an additional 15% of Ophiolite. The minority shareholders in Ophiolite (who hold the remaining 15%) are free carried to the completion of a bankable feasibility study of the Project. With the completion of the BFS, in accordance with the Incorporated Joint Venture Agreement – Pick Lake Project, the minority shareholders who hold the remaining 15% are no longer free carried.

The Project consists of the Pick Lake Deposit and the Winston Lake Deposit. The Pick Lake Deposit is under an option agreement with Orebot Inc ("**Orebot**"), while the Winston Lake Deposit is under an option agreement with First Quantum. The details of these agreements are described below.

### Orebot Option Agreement

In August 2016, Ophiolite signed an option agreement with Orebot to acquire the Pick Lake tenements. Orebot is owned by Kevin Kivi, a Canadian prospector. The option agreement included a due diligence period of 90 days with an initial payment of C\$25,000. The option was exercised, and the key terms of the agreement are as follows:

- A 2% NSR from minerals produced from the Pick Lake leases and claims. Ophiolite can elect to buy back 50% of the NSR for a payment of C\$1,500,000. In the Financial Model, the Company has allowed for this buyback and therefore royalties are calculated at 1%;
- C\$75,000 on the twelve (12) month anniversary (paid in August 2017);
- C\$300,000 on the twenty-four (24) month anniversary (paid in August 2018);
- C\$300,000 on the thirty-six (36) month anniversary (paid in August 2019); and
- C\$500,000 on the forty-eight (48) month anniversary due in August 2020.

### First Quantum Option Agreement

In February 2018, Ophiolite signed an option agreement with First Quantum to acquire the Winston Lake Mine. Under the agreement Ophiolite was granted a 48-month option period, with an initial payment of C\$100,000 and up to three further option extension payments of C\$50,000, each payable on the anniversary of the agreement with First Quantum. The first C\$50,000 option extension payment has been made. On exercise of the option, Ophiolite agrees to:

- A 2% net smelter royalty (NSR) from minerals produced from Winston Lake. Ophiolite can elect to buy back 50% of the NSR for a payment of C\$3,000,000.
- Assume all liabilities in connection with the property in all respects, including liabilities created or related to periods prior to the completion date; and
- Replace the letter of credit of C\$1,200,000 (or such greater amount as may be in place as of the completion date), currently issued in favour of the Ministry of Northern Development and Mines or any other governmental entity in respect of the property. This letter of credit covers environmental liability.

## Geology and Exploration

### History

The property was discovered by prospectors in 1879 with high-grade zinc ore discovered in the Zenith Lake area, which is adjacent to Winston Lake. Development on the site of the Zenith deposit commenced in



1900 and by the end of 1901 some 2,700 tonnes were mined with 800 tonnes of ore averaging 45% Zn. Between the late 1960s and early 1970s an additional 165,000 tonnes at 16.5% Zn of ore was mined before operations ceased.

In 1986 the development of the Winston Lake Mine was commenced by Inmet (subsequently acquired by First Quantum) and involved exploitation of probable and possible reserves of 3.4 million tonnes grading 1.0% copper, 16% zinc, 0.96 oz silver and 0.03 oz gold per tonne.

The development of the Winston Lake Mine included a 740m shaft, 2,500m of lateral drifts and crosscuts and the construction of mine buildings, 1,000tpd mill and tailings ponds and dams. Operations continued for 11 years, with production from the Pick deposit adding to the ore feed from 1995, until operations were suspended in December 1998. The operation was finally closed in February of 1999 due to a very low zinc price at the time (US\$0.42/lb).

After mining ceased at the Winston Lake and Pick Lake deposits, the claims covering the Pick deposit lapsed and were staked by the prospector Kevin Kivi in 2008.

In the period from mine closure until the acquisition of the Project by the Company, minimal exploration was completed. Exploration undertaken prior to Superior Lake's involvement included an aerial versatile time-domain electromagnetic (VTEM) and aeromagnetic surveys in 2011 and field work on the structure and litho-geochemistry of the area adjacent to the Winston Lake and Pick Lake deposits. During this time, there was no attempt to systematically collect or interpret structural data, including interpretation of the electromagnetic conductors, nor were any geochemical alteration studies undertaken.

Since acquiring the Project, the Company has completed a targeted drilling program, updated and increased the JORC (2012) resource, carried out a litho-geochemical review and conducted modern geophysics over the 3km x 3km brownfield area adjacent to the Pick and Winston deposits.

## Geology

The Project is located within the Big Duck Lake Volcanic Belt which is part of the Archean Shebandowan-Wawa Volcanic Belt of the Superior Province of the Canadian Shield. Within the Big Duck Lake Volcanic Belt, the Winston Lake Sequence is comprised of a series of predominately felsic to intermediate volcanics, volcanoclastics and sediments with minor mafic flow, all with a calc-alkalic affinity. The sequence reaches a maximum thickness of 2km and a strike of approximately 6km.

The Winston deposit occurs as a single massive sulphide sheet over a strike length of 500m and a depth extension between 300 to 700m vertically. Dipping at an average of 50deg and an average of 7m thickness, with the maximum thickness in excess of 40m. At Winston there are two primary ore types. The first and most common is a fine to medium grained homogenous mix of pyrrhotite and sphalerite. The second ore type is composed of medium to coarse grained sphalerite with minor amounts of chalcopyrite, pyrrhotite and pyrite.

The Pick deposit is located 1km stratigraphically below the Winston deposit with an average strike length of approximately 250m and a depth extension tested between 300 to 1200m. Mineralization at Pick consists of fine-grained sphalerite, pyrrhotite, with minor chalcopyrite and pyrite.

## Mineral Resource

The Project Mineral Resource estimates were prepared by independent resource consultant MASSA Geoservices as part of the BFS and were reported in accordance with JORC (2012) guidelines. The Project Mineral Resource is summarised below (see footnote 1, page 2).

**Table 8: Mineral Resource Estimate\***

Classification	Tonnage (Mt)	Zn%	Cu%	Au g/t	Ag g/t
<b>Pick Lake</b>					
Indicated	1.78	19.2	0.9	0.3	36
Inferred	0.27	16.4	1.0	0.3	38
<b>Total – Pick Lake</b>	<b>2.05</b>	<b>18.8</b>	<b>0.9</b>	<b>0.3</b>	<b>36</b>
<b>Winston Lake</b>					
Indicated	0.29	10.4	0.7	0.9	18
Inferred	0.01	8.9	0.6	0.5	12
<b>Total – Winston Lake</b>	<b>0.30</b>	<b>10.4</b>	<b>0.7</b>	<b>0.9</b>	<b>18</b>
<b>Superior Lake</b>					
Indicated	2.07	18.0	0.9	0.4	34
Inferred	0.28	16.2	1.0	0.3	37
<b>Total – Superior Lake</b>	<b>2.35</b>	<b>17.7</b>	<b>0.9</b>	<b>0.4</b>	<b>34</b>

\*Mineral Resources are inclusive of Ore Reserves. The Mineral Resource was estimated within constraining wireframe solids using a nominal 3% zinc cut-off grade. The resource is quoted from all classified blocks within these wireframe solids. Differences may occur due to rounding.

The Company has significant confidence in the resource model as the mineralisation of the deposits essentially occurs as a single massive sulphide seam distributed along the Volcanogenic Massive Sulphide (VMS) horizon. The distances between drill holes intersecting the mineralisation in the Winston deposit is 10 to 30m and 20 to 40m at the Pick deposit.

The geological interpretation of the mineralisation was confirmed by the mid-Pick drilling, with the resource model based on the drill holes data (approximately 1787 drill holes) and digitised underground drive maps and cross sections. Approximately 90% of the Mineral Resource is classified as an indicated resource.

## Ore Reserve

The Project Ore Reserve estimates were prepared by independent mining consultant Orelogy Consulting Pty Ltd and were reported in accordance with JORC (2012) guidelines. The Project Ore Reserves are summarised below.

**Table 9: Ore Reserve Estimate<sup>4</sup>**

Superior Lake Ore Reserve					
Classification	Tonnage Mt	Zn%	Cu%	Au g/t	Ag g/t
Probable	1.96	13.9	0.6	0.2	26.2
<b>Total</b>	<b>1.96</b>	<b>13.9</b>	<b>0.6</b>	<b>0.2</b>	<b>26.2</b>

- Ore Reserves were estimated only on the Indicated portion of the Mineral Resource Estimate. The average cut-off grade applied was 5.2% Zn. The Ore Reserve was achieved by creating a mining block model from the resource model and the detailed mine design and mine scheduling. The mining schedule includes mining loss, with a calculated average mine dilution of 31% incorporated in the model. The Ore Reserves have been classified as Probable based on guidelines specified in the JORC Code (2012).



## Mining

The mine development has considered two options; the first being the re-establishment of the shaft system, refurbishment of the 615m level, and the development of a 1 in 7 hangingwall ramp at Pick. The second option would see a ramp developed from the surface, starting adjacent to the historical workings of Zenmac, across to the upper Resources of the Pick deposit, and then a 1 in 7 hangingwall ramp is developed to access the lower Resources at Pick. Work completed during the BFS indicates the ramp from the surface is the preferred option based on the following:

- Capital and operating cost slightly lower;
- Timing to first production is faster, and
- Potential risk impacts to the production schedule is seen as lower.

The mine design scheduling and costing for the decline option were undertaken by Orelogy Consulting Pty Ltd. They assumed all development headings will be developed using twin boom jumbos, which will also do the ground support installation. To accommodate the equipment, all accesses and drives will be developing using a minimum of a 4.5mH X 4.5mW profile. The main decline ramp is to be 5.0mW X 5.5mH to accommodate 40t trucks to optimize haulage costs. All headings will be designed at a minimum of 1 in 50 (2%) gradient to ensure drainage and the maximum gradient of declines and level accesses will not exceed 1 in 7 (14%). Existing lateral and vertical development at Pick has been utilized to reduce costs.

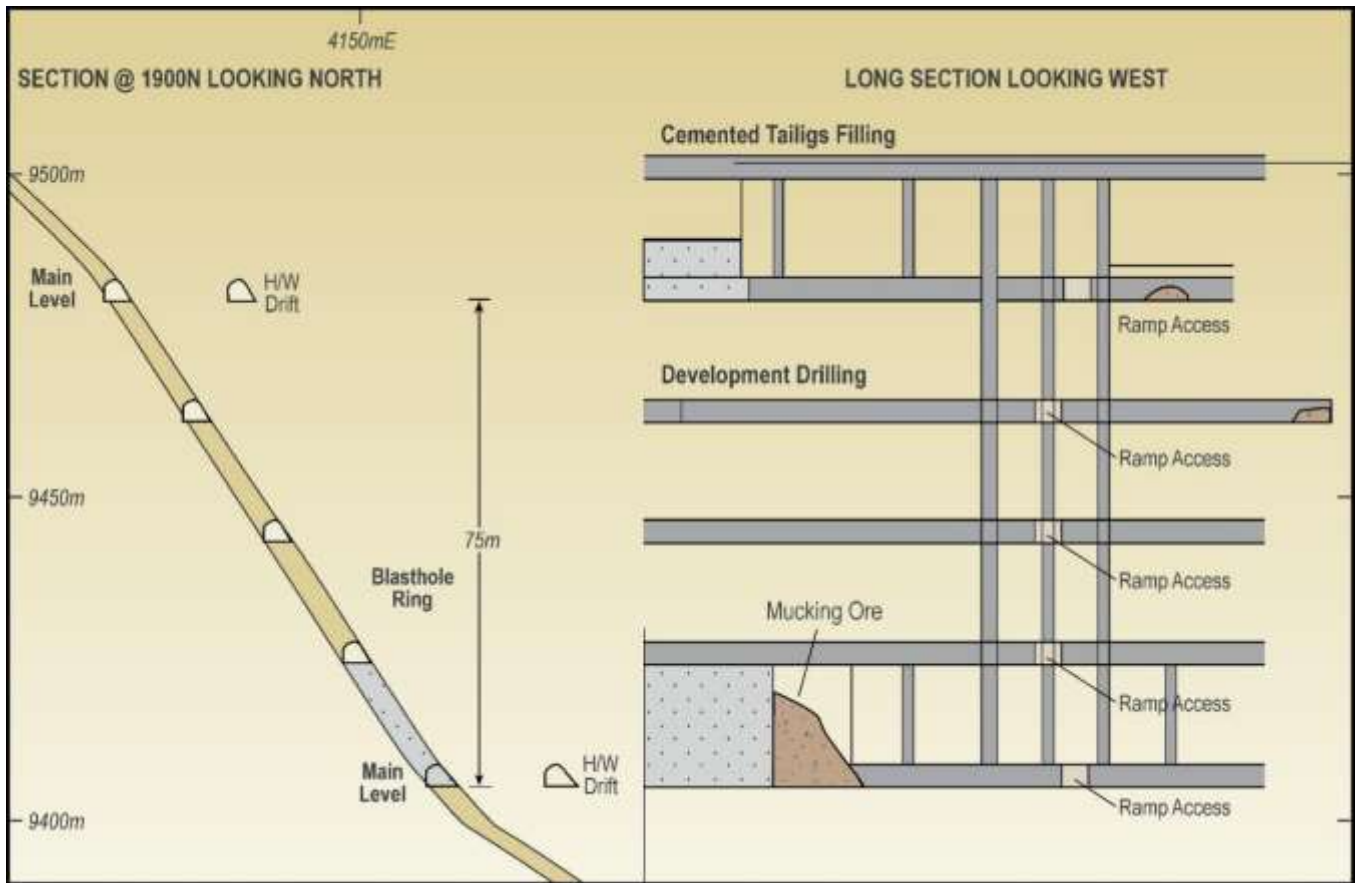
The Pick access ramp has been aligned to access existing vertical development to facilitate early primary ventilation and to provide drilling and potential access platforms for exploration targets.

The stoping methods used during historical operations included mechanised cut and fill, AVOCA and Alimak. Towards the end of the historic mine operations, a test stope was successfully completed at the Pick deposit using sub-level longhole stoping. The Company has selected longhole open stoping (LHOS) with introduced cemented paste fill as the preferred mining method.

The key tenets of the strategy underlying the mine design at the Project are:

- Leverage the sunk capital at the Project;
- Use proven modern mechanised mining methods and equipment;
- Adopt cemented paste fill, a proven reliable and efficient fill technology;
- The mine design needs to be cognisant of the future conversion of Inferred Resources to Ore Reserves; and
- The mine design needs to be cognisant of the potential resource upside associated with the brownfields exploration targets at the Project.

The mine design will see the deposit split into mining areas, namely Pick Upper, Pick Middle (A & B) and Pick Lower (A & B). Each area consists panels of between four and five levels that also take cognizance of existing levels, with the narrower parts of each panel being mined top down and the thicker areas being mined bottom up. Some areas of the upper levels of Pick Upper use open stoping with rib pillars to improve economics. The stopes will be mined retreating on each level towards the centre where the level accesses will be located. This retreat mining minimizes the requirement for additional waste development. Once the level is complete and paste fill has cured, mining on the adjacent level can begin. During this curing time stopes can be mined in a different panel.



**Image 7: Stopping Sequence Schematic**

The ramp access will follow the historical preference and will be located in the hangingwall. Crosscuts from the ramp to commence ore development will be developed from the ramp to the ore at between 15m and 20m spacings, dependent on the thickness of the ore, to minimize any potential dilution and ore losses.

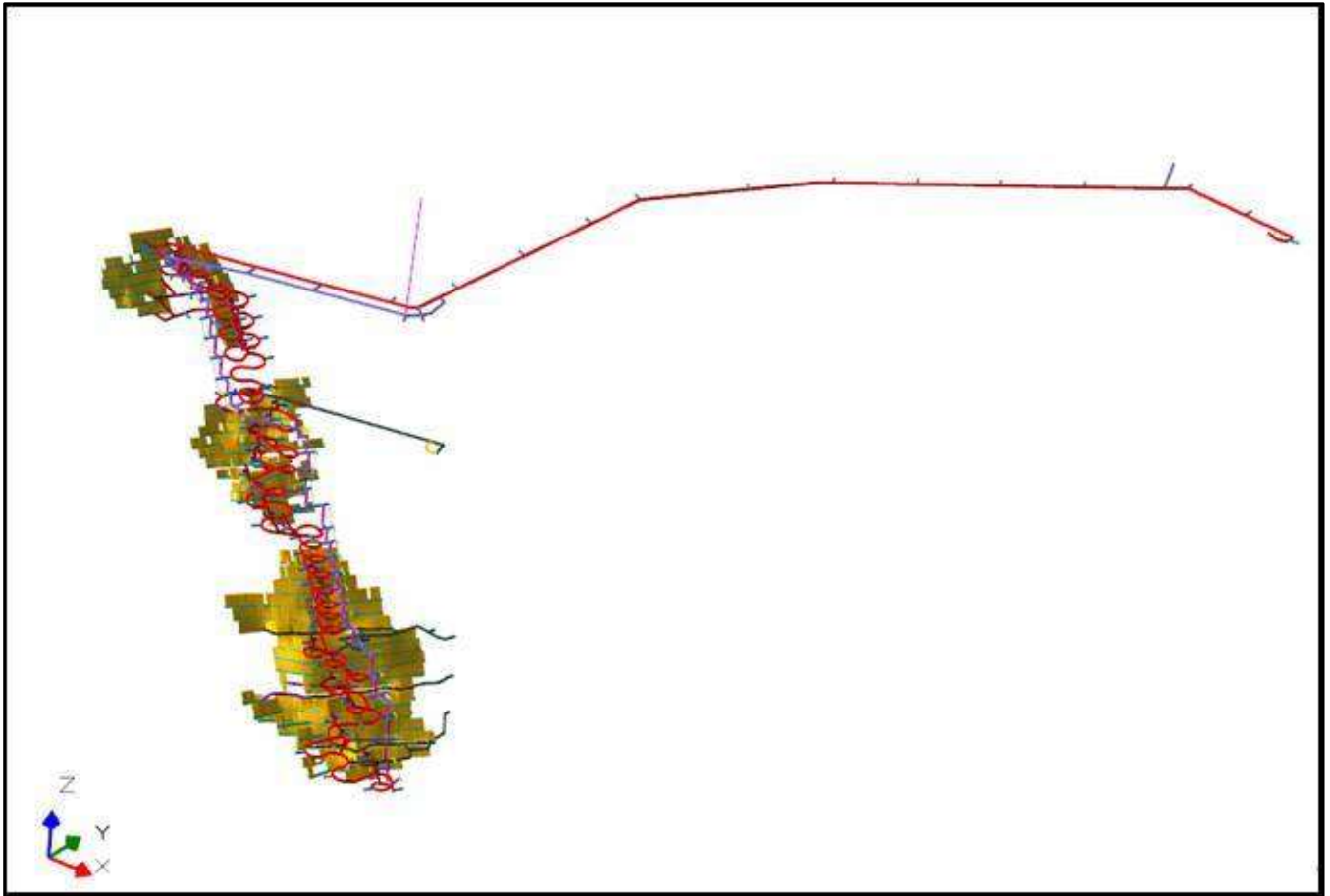
Ore drives will be developed using resue firing. Resue firing involves the separate blasting and removal of the ore and waste. . This has been shown to decrease the dilution of the development ore where the ore is narrower than the profile of the development face.

The primary ventilation network consists of the decline ramps for intake and a series of ventilation and escape raises that parallel decline development with connection to the exiting Pick raises at strategic points. It was designed in stages to align with the mine's development at logical points;

- Stage 1: Establishment of initial primary network for continued ramp development using Winston Shaft
- Stage 2: Connection to existing Pick RAR
- Stage 3: Pick Upper Stopping
- Stage 4: Pick Middle Stopping
- Stage 5: Pick Lower Stopping Life of Mine

A mine schedule was created from the designs in Deswik mine planning software. Discrete activities were scheduled based on a logical sequence of preceding and succeeding activities. Industry average productivities, taking cognizance of local conditions, were applied to activities to determine the Mine Plan. Resource levelling was applied to the schedule to derive periodic quantities and fleet requirements.





**Image 8: Planned Development Layout**

### Geotechnical

Mine Design Engineering Ltd (MDEng), specialized geomechanical engineers, completed the geotechnical review in the BFS. The geotechnical work confirmed that the longitudinal open stoping is expected to be a geotechnically sound mining method for Pick Lake. MDEng note that its numerical stress models have predicted that diminishing pillars horizontally and vertically may incur stress related challenges. The geotechnical work noted that the empirical stope stability assessment concluded that in typical ground conditions stopes are expected to perform well. In the Pick Middle and Pick Lower stopes hangingwall (HW) cable bolt support would be required. Dilution estimates were provided and are in line with the calculated 31% dilution expected during mining operations.

### Hydrogeology

The 11-year historical operations and continual monitoring of the water post closure indicates a relatively low hydraulic conductivity at the mine. The underground mine is dry, with groundwater inflow estimated at 0.05 litres per second. Historical records show the average pump rates from the mine were 200 m<sup>3</sup> per day (~2.5 litres per second) inclusive of mine production and groundwater inflow.

### Processing

The Company will adopt the operating criteria that was used successfully for over a decade in the original Winston Lake Mine 1,000tpd concentrator. The proven process flow sheet that will be adopted in the processing facility will consist of a comminution circuit and two stage flotation circuit, one for copper and one for zinc. Copper and zinc concentrates will be shipped for smelting by a third party.



**Historical Operations**

The Inmet plant processed approximately 3.3 million tonnes over an 11-year period producing 900Mlbs of zinc, 53Mlbs of copper and over 50,000 ounces of gold at reported recoveries of 93% (zinc) and 78% (copper). The mine closed in 1999 due to a sustained period of low zinc prices and the plant, mine and associated infrastructure decommissioned and dismantled

The previously installed mill consisted of a three-stage crushing circuit followed by a two-stage (rod and ball) milling circuit. A copper concentrate was produced in the first stage of flotation where the copper rougher concentrate was reground before the final stages of cleaning. The copper rougher and cleaner tails were then conditioned and a zinc concentrate produced in this second stage of flotation. Again, the zinc rougher concentrate was reground to improve final concentrate quality. Concentrates were thickened before being filtered in two pressure filters. The ore was processed at a rate of 1,000tpd and approximately 250 to 350tpd of concentrates was produced which was trucked to a rail siding in the town of Schreiber and loaded onto rail cars for shipment to smelters.

The past production demonstrates that the mineralisation is amenable for processing using conventional flotation technologies and that the valuable metals are effectively recovered as either a copper or zinc sulphide concentrate. Table 10 shows a summary of the annual production data from commencement of operations in 1988 to cessation of operations in 1998.

**Table 10: Historical Production Data**

Year	Tonnes Milled	Head Grade				Recoveries (%)				Metal Produced			
		Zn %	Cu %	Ag g/t	Au g/t	Zn	Cu	Ag	Au	Zn (Mlbs)	Cu (Mlbs)	Ag (koz)	Au (koz)
1988	220 326	16.6	0.85	32.2	0.85	91.4	73.6	30	40	73.75	3.05	68.3	2.43
1989	302 843	15.8	0.92	32.0	1.08	94.4	78.4	37	36	99.29	4.80	113.8	3.84
1990	346 371	17.7	1.10	36.6	1.44	95.2	79.7	39	43	128.9	6.70	160.2	6.95
1991	347 171	16.4	1.22	38.7	1.70	94.7	81.4	45	41	119.2	7.58	192.5	7.77
1992	346 662	15.8	1.28	40.6	1.82	94.7	81.3	43	43	114.2	7.95	192.8	8.67
1993	365 094	15.5	1.22	36.9	1.63	94.4	79.6	36	38	117.4	7.81	156.7	7.35
1994	358 346	14.7	1.04	26.7	1.65	94.4	77.4	37	30	109.2	6.38	114.3	5.72
1995	321 671	11.3	0.92	26.2	1.48	92.5	77.4	33	31	73.9	5.04	88.6	4.71
1996	304 060	10.6	0.87	26.6	1.09	91.4	75.9	33	35	64.7	4.43	85.7	3.73
1997	227 011	9.9	0.84	21.9	0.96	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1998	129 143	8.5	0.59	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total	3 268 698	-	-	-	-	-	-	-	-	900.7	53.7	1 172	51.17
Year Ave.	313 956	13.9	0.99	31.8	1.37	93.7	78.3	37	38	100.1	5.97	130.3	5.69

**Metallurgy**

The metallurgy of the Pick material is relatively simple, with the opportunity to recover the valuable elements to separate copper and zinc concentrates. The copper is recovered first, with the zinc recovered from the copper tails. This is the process that was used historically and is proposed for the new operation. This circuit was tested at SGS Canada's laboratory in Lakefield using samples from mid-Pick collected during the 2018 resource extension drilling program.

The metallurgical testwork undertaken by SGS consisted of comminution testwork, flotation optimisation testwork, a locked cycle test to confirm metal recoveries and concentrate grades. Samples from the tests



were also used to define thickening and filtration data, along with geochemical characterization of the tailings.

In addition to this, cemented paste testwork was undertaken on the tailings from the testwork and samples collected from the TSF to support the mine development program.

The comparison between the flotation results achieved in this program, the results achieved when the Pick test stope material was treated in the plant (7 days operation in January 1999), the Pick Upper production date and the average of the historical data is shown below in Table 11.

**Table 11: Metallurgical Recoveries**

Metal	2019 Met Testwork		Pick Test Stope Ore		Pick Upper Production		Historical Production	
	LCT Recovery	Concentrate Grades	Pick Recovery	Concentrate Grades	Average Recovery	Concentrate Grades	Average Recovery	Concentrate Grades
Zinc	96%	48%	97%	54%	91%	53%	93%	50-52%
Copper	71%	24%	61%	28%	74%	24%	78%	26-28%
Gold <sup>8</sup>	18%	0.4g/t <sup>9</sup>	31%	9g/t	29%	13g/t	38%	11g/t
Silver <sup>10</sup>	46%	276g/t	32%	750g/t	31%	311g/t	37%	310g/t

Based on the averages of the Pick Upper, Pick Mid and Pick Lower tonnages from the mining schedule, overall recoveries of 96%, 77%, 32% and 36% have been determined for zinc, copper, gold and silver respectively over the life of mine.

Historical zinc concentrate grades were between 52% and 53.5% zinc and copper concentrates ranged from 22% to 25% copper. The recovered gold and silver reported to the copper concentrate where it adds the most value as payable metal. The historic gold and silver grades in the copper concentrate were around 11g/t gold and 310g/t silver. The zinc and copper results for the Pick Test Stope, Pick Upper and the 2019 testwork are in line with the historical information, but the 2019 testwork shows lower gold recoveries and gold concentrate grades due to the very low head grade of the metallurgical sample (only 0.08g/t Au versus resources grade of 0.4g/t Au).

Based on the weighted average of the Pick Upper, Pick Mid and Pick Lower tonnages from the mining schedule, expected concentrate grades over the life of mine are 52% Zn, 26% Cu, 6g/t Au and 544g/t Ag.

It is expected that the Project will produce high quality concentrates, free of deleterious elements and with low impurities of critical elements such as arsenic, antimony and mercury which is consistent with the historic operations. Table 12 shows both historical impurity grades and the impurity levels in the concentrates produced in the 2019 met testwork. It is expected that concentrates produced by the Project will be in high demand.

<sup>8</sup> Reporting to copper concentrate

<sup>9</sup> Head grade only 0.08g/t Au

<sup>10</sup> Reporting to copper concentrate

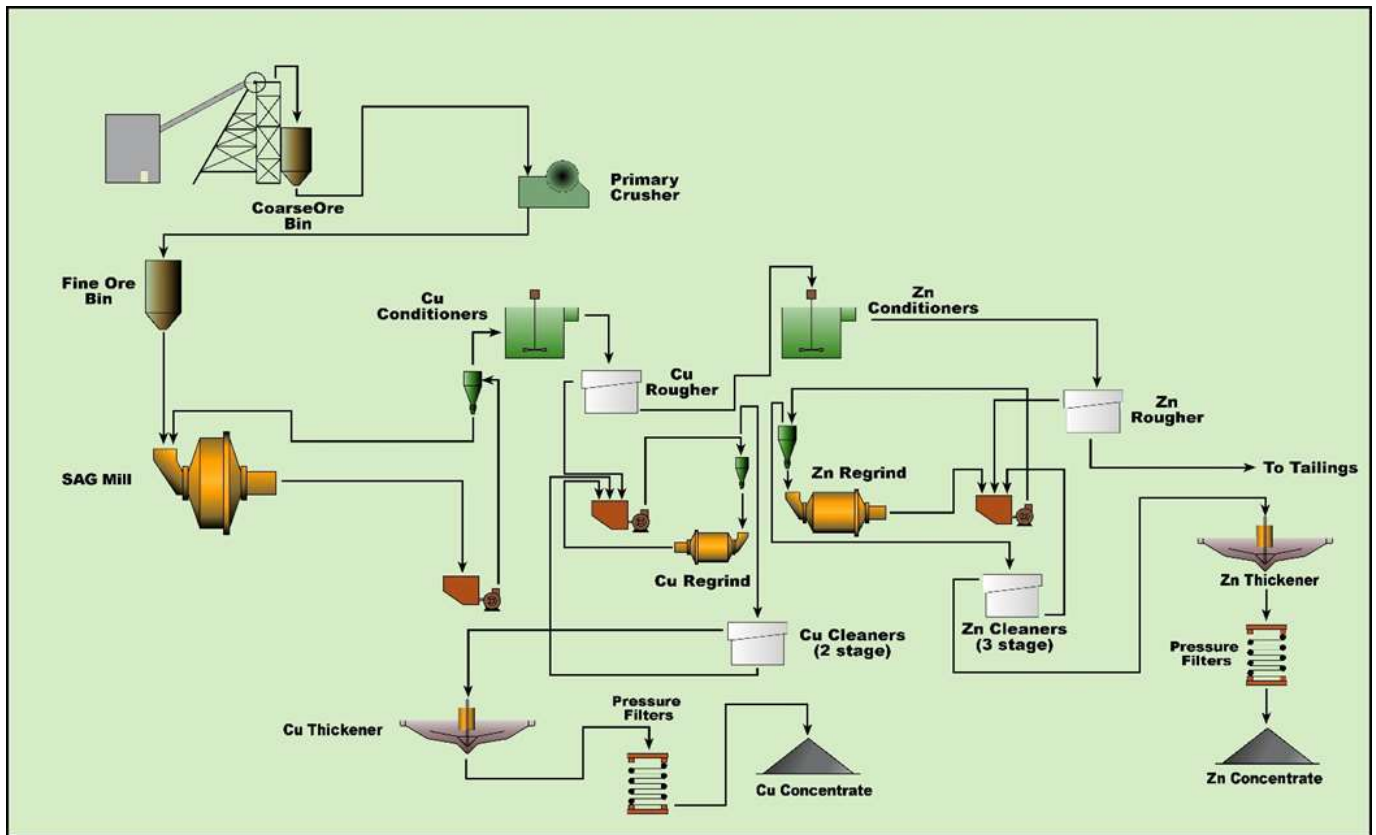
**Table 12: Concentrate Specifications**

Element	2019 Met Testwork		Historical Results	
	Zinc Concentrate (%)	Copper Concentrate (%)	Zinc Concentrate (%)	Copper Concentrate (%)
Fe	14.6	26.7	10.2	28.7
Cu	0.33	24.4	0.67	24.7
Ni	0.009	<0.030	0.002	0.008
Pb	0.026	0.156	0.010	0.074
Zn	47.9	9.12	55.0	7.47
Bi	<0.002	<0.04	0.008	0.023
Cd	0.18	0.033	0.13	0.018
Cr	0.004	<0.004	0.008	0.010
Co	0.037	<0.02	0.010	0.019
Ge	-	-	0.002	0.002
In	-	-	0.033	0.011
Mn	0.073	0.025	0.15	0.024
Hg	0.0002	0.00007	0.0005	0.0003
Mo	<0.0007	0.068	<0.001	<0.001
As	<0.003	<0.012	<0.002	0.011
Sb	<0.002	<0.040	0.002	0.005
Sn	<0.004	<0.08	0.018	0.017
Se	0.010	<0.200	0.032	0.030
Te	-	-	0.0001	0.0005
F	-	-	0.036	0.005
Cl	-	-	0.016	0.007
S	32.9	29.4	32.4	34.8
SiO <sub>2</sub>	1.74	3.92	0.44	1.10
Al <sub>2</sub> O <sub>3</sub>	<0.5	0.13	0.059	0.13
CaO	0.09	0.54	0.047	0.057
MgO	0.25	0.58	0.19	0.37
BaO	-	-	0.008	0.027
Au	0.06g/t	0.43g/t	0.39 g/t	12.9 g/t
Ag	25.6g/t	276g/t	41.2g/t	344 g/t

### Process Plant

The process flowsheet development and plant design were undertaken by Primero Group Ltd (Primero). The new plant will include a SAG mill in the comminution circuit replacing the rod and ball mills used during historic operations. The flotation plant consists of separate, sequential copper and zinc circuits using multiple stages of cleaning with regrind of the rougher concentrates. Nominal throughput for the plant is 1000 tpd (325,000 tonnes per annum) with an average of 73,000 tonnes per annum zinc concentrate and 5,200 tonnes per annum copper concentrate produced. The concentrates are filtered and loaded into seatainers for transport down to the rail siding in Schreiber for delivery to local smelters or export via the ports of Quebec or Vancouver (Image 9 shows a schematic of the process plant).

Based on the current mine plan the majority of the tailings from the flotation plant will be required for stope backfill underground. As such the tailings will be pumped to the paste plant to be prepared to be sent underground as cemented backfill.



**Image 9: Process Plant Schematic**

## Existing Onsite Infrastructure

### Tailings Storage Facility

The existing surface infrastructure at the Project site related to the tailings and water management includes:

- TSF;
- Polishing Pond;
- Sedimentation Pond;
- Freshwater Reservoir; and
- South Pond.

The TSF contains tailings from the historic Winston Lake Mine operations and has been continually tested annually for compliance during historic operations and post historic operations closure. Given the adoption of paste fill in the mining cycle, the majority of the tails produced from the re-start of operations will be stored in the mined-out stopes underground. The TSF will be used when tails cannot be placed underground due to there not being a stope available under the mining. It is forecast that this would occur for periods of less than 1-2 weeks at a time.

The TSF is contained by a Tailings Dam (Main Dam and Dyke 2) located at the northern end and the elevated topography elsewhere around the Project site. An emergency spillway is in the west abutment of the Tailings Dam (image 10). The Sedimentation Pond is contained by a dyke and includes a splitter dyke located within the centre of the Sedimentation Pond. Water drains from the Sedimentation Pond via a decant overflow and 8-inch pipeline to the Polishing Pond. The Polishing Pond is contained to the north





and west by a relatively low dyke. Water drains from the Polishing Pond through two overflow culverts to the Whitesand River.

The South and North Water Diversion Dams are in the south and north of the site, respectively. These dams were constructed to divert surface water runoff away from the site. The ponds created by these diversion dams are known as the South Pond and Freshwater Reservoir. Excess flows to the Freshwater Reservoir and South Pond are drained through a diversion channel and natural lake systems respectively, which ultimately report to the Whitesand River.

Currently, the site runoff is primarily stored in the tailings basin with treatment accomplished in the Sedimentation and Polishing Ponds. Site runoff collected by site collection ditches reports to a sump system and is pumped back into the tailings basin. Storage water is currently being treated to meet environmental requirements prior to ultimate discharge into the Whitesand River. As part of the BFS, Wood Consultants have completed a Hazard Potential Classification on the facility in line with the Ministry of Natural Resources and Forestry (2011) and the Canadian Dam Association Dam Safety (CDA, 2013) Guidelines with classification deemed as Low for all incremental losses and the hazard potential classification is Low.



**Image 10: Tailings Storage Facility from Plant Site**

### Power

The anticipated electrical loads for the Project will require an 10MW substation, which will cover all mine, mill and service requirements. The existing substation and primary transformer (Image 11) along with all switchgear will be refurbished or replaced as required. New distribution and motor control centres (MCCs) will be installed for the mine, plant and administration areas.



**Image 11: Plant Site and Power Infrastructure**

## Water

The Company has adopted a strategy to minimize the net use and discharge of water. The following assumptions have been made in the BFS:

- The mill will operate on reclaim water from the TSF and Polishing Pond, with fresh water used for reagent mixing only;
- Mine water will discharge to the Sedimentation Pond and then will be pumped to the Polishing Pond. The pump station in the Polishing Pond will deliver water for re-use in the process plant;
- Wastewater from a 50m<sup>3</sup>/day potable water plant and wastewater from an effluent treatment plant will be pumped to the tailings pump box;
- Installation of a new 40m<sup>3</sup>/day sewage treatment plant; and
- Upgrade the current effluent treatment plant to treat surplus water from the TSF.

Historically, the mine discharged approximately 2,200m<sup>3</sup> per day, with the present strategy targeting discharge rates between 250m<sup>3</sup> and 500m<sup>3</sup> per day.

## Offsite Infrastructure

### Access Road

The Project is located in north-western Ontario, Canada, 180km east of the City of Thunder Bay, easily accessed by car along the TransCanada Highway. From the TransCanada Highway, the Project is accessed via a well-maintained 20 km unpaved road.

The Company proposes to enter into a joint venture with First Nations communities to transport the concentrates in sealed containers to the rail siding located at the town of Schreiber, 30km from the Project.

From the rail siding concentrates are easily transported to customers in North America or ports in Quebec or Vancouver for export to Europe or Asia.

### Power Supply

The Project is supplied with power via an existing 115kV transmission line which is in good condition and will service the site during both the construction and operational phases. The anticipated loads will require a 10MW substation, which will cover all mine, mill and service requirements. The substation will house primary transformers (10MVA) and switchgear.

The Project expects to enter into a power supply contract with the local power authority.

### Accommodation

A 180-person accommodation camp is proposed and will be located on the site of an existing motel complex adjacent the turn-off from the Trans Canadian highway to the Project site. Superior Lake has received proposals to outsource the refurbishment and operation of the camp by third parties.

### Capital Cost Summary

The construction capital required for mine development, inclusive of the decline to access the Pick ore, a 325,000tpa plant and associated infrastructure is estimated to be US\$86M (excluding Owner's costs and pre-production). This includes a 9.5% overall contingency and is based on the following:

- Owner Operator mining for the mine development
- SAG milling
- Two-stage flotation (copper and zinc)
- Concentrate filtration and loading into seatainers
- Use of existing transmission line to site (115kV)
- Use of existing site access road
- Use of existing tailing storage facility (TSF)
- Upgrades to surface water infrastructure and water treatment plant

The capital cost is based upon an estimate date of Q2 2019 with an accuracy of -10% +15%. The breakdown of the capital cost estimate is shown in Table 13 below:

**Table 13: Project Capital Cost Estimate**

Cost Centre	US\$M
Site General	0.8
Process Plant	43.5
Infrastructure	7.5
Mine Development	13.2
<b>sub-total Direct Capital Costs</b>	<b>65.1</b>
EPCM / Management	5.4
Construction Indirects	7.7
<b>sub-total Indirect Capital Costs</b>	<b>13.1</b>
Contingency	<b>8.6</b>
<b>Total</b>	<b>86.7</b>

Owner's and Pre-production costs are described below



**Table 14: Project Owner's and Pre-Production Cost Estimate**

Cost Centre	Pre-Production (US\$M)
Owner's Costs	1.8
Mining Pre-production	5.0
Plant Pre-production	3.6
<b>Total</b>	<b>10.5</b>

A life of mine sustaining capital amount of US\$43M (average US\$5.1M per annum) has also been included in the discounted cash flow model.

Closure costs forecast to be incurred on completion of the operation are estimated at US\$14.6M. This figure will be finalized as part of the Project Closure Plan which is expected to be completed in Q1 2020.

### Operating Cost Estimate

The operating cost is presented below assuming a mine delivery of 1,000tpd ore and an average of 750tpd waste material and a 325,000tpa processing plant with grid power producing individual copper and zinc concentrates. The operating cost is based upon an estimate date of Q2 2019 with an accuracy of -10% +15%, no contingency allowance has been assumed.

**Table 15: Project Operating Cost Estimate<sup>11</sup>**

Cost Centre	US\$M / year	US\$/t ore	US\$/lb Zn
Mining	17.5	53.28	0.16
Labour (excl. mine personal)	5.6	16.92	0.05
Operating consumables	4.0	12.34	0.04
Power	1.8	5.37	0.02
Maintenance material	1.0	3.18	0.01
General and Administration	2.8	8.58	0.03
<b>Total</b>	<b>32.6</b>	<b>99.66</b>	<b>0.30</b>

### Marketing

While the Company is yet to enter into any agreement with potential offtake counterparties, the Company has received strong interest from global metal traders regarding the zinc and copper concentrates expected to be produced at the Project. This interest has resulted in two non-binding indicative proposals being received to date.

Such interest from leading international metal traders highlights the quality of the concentrate to be produced at the Project, with favourable grades and minimal deleterious elements. These proposals are the first step towards securing binding offtake agreements. The intention is to enter into offtake agreements with between one and three parties.

### Financial results

The indicative financial results for the Project based on the inputs described previously are shown in Table 16 below. The key input data for the evaluation is:

- Initial capital expenditure – US\$86.7M
- Pre-production – US\$8.6M
- Owner's Costs – US\$1.8M

<sup>11</sup> Based on Steady State production numbers as referenced in Process Design Criteria

- Average sustaining capital – \$5.1M/annum
- Operating cost
  - Mining cost – US\$53.28/tonne ore (average life of mine)
  - Annual Fixed costs – US\$9.8M (excluding mining)
  - Variable costs – US\$16.49/tonne ore (excluding mining)
- Concentrate transport cost of US\$40.15/tonne conc (assuming delivery to Valleyfield smelter)
- Zinc pricing of US\$1.22/lb Zn – a long-term zinc price based on the average consensus price from five global institutions (CUBC, SBG Securities, Cormark Securities, Eight Capital and Deutschebank) was applied. The information was sourced from S&P Global on 2 August 2019.
- Zinc Treatment Charges (TC) of US\$130/tonne concentrate – Image 13 shows the sensitivity of the Project NPV to changes in Zinc Treatment Charges.
- Plant throughput – 325,000 tonnes per annum
- Head grades – 13.7% Zn, 0.6% Cu
- Metallurgical recoveries – 96% Zn
- Tax rate – 28%
- Royalties – 2% on Pick ore (1% bought back for US\$1.5M)

Financial modelling is based upon 100% ownership, no debt, 9-year life of mine, and the capital and operating costs supplied by Oreology, Primero, Nordmin and Wood. The key financial results are:

**Table 16: Project Financial Summary**

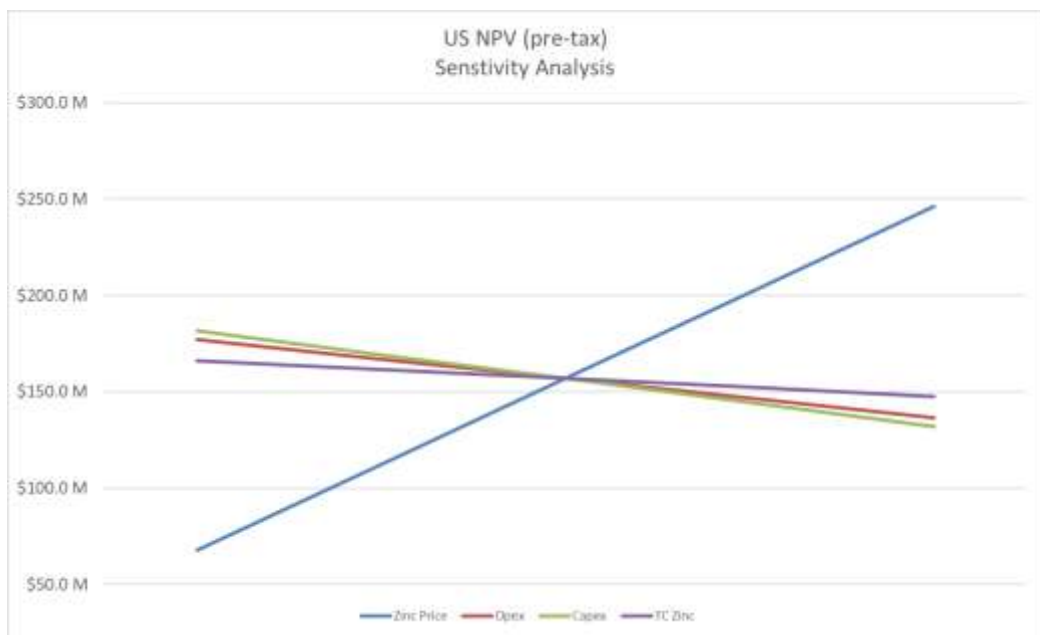
Criteria	Value
NPV <sub>8</sub> (pre-tax)	US\$158M
NPV <sub>8</sub> (post-tax)	US\$115M
IRR (pre-tax)	31%
IRR (post-tax)	27%
EBITDA/annum (average LOM)	US\$34M
Initial Capital Cost	US\$87M
Owner's and Pre-production	US\$10M
Production (average LOM)	32ktpa contained Zn
Zinc pricing (long-term)	US\$1.22/lb Zn
C1 Operating Cost (average LOM)	US\$0.35/lb Zn
AISC Cost (average LOM)	US\$ 0.46/lb Zn
LOM	9 Years





**Image 12: Project Cashflow Forecast**

Image 13 shows the sensitivity of Project NPV to the zinc price, operating costs, capital costs and treatment charges.



**Image 13: Project Sensitivity**

## Funding

As shown in Tables 13 and 14, funding in the order of \$100M is required to achieve the outcomes indicated in the BFS. The Company's Board and Management have had a successful track record of developing and financing mineral resource development globally. Representatives of Board and management have been involved in the financing and development of a number of resources projects including Crocodile Gold's three Australian gold mines, Cradle Resources' Panda Hill Project and Boss Resources Honeymoon Project. Representatives of Board and management have also worked for Verona Capital, a Perth based private investment firm that has an extensive record in raising capital. Further, the Company is shortly commencing



an exploration program to test recently identified geophysical anomalies (see ASX announcement 25 July 2019). This is part of the Company's objective to increase the Mineral Resource, which if successful, would enable an extension of mine life.

The Project's positive technical and economic fundamentals provide a platform for the Company to advance discussions with traditional debt and equity financiers. Discussions with potential offtake partners has also highlighted the possibility of additional funding outside of the senior project finance facility to be linked with offtake. An offtake related financing typically is in the form of mezzanine debt or concentrate pre-payments. This funding would further reduce the equity component for financing Project development.

The Company has engaged Orimco Resource Investment Advisers ("**Orimco**"), to act as its advisor with respect to Project financing. Orimco has engaged with a significant number of institutions, including major global banks and resource funds based in both Australia and overseas. Pursuant to the financing process that commenced in May 2019, it has received multiple non-binding indicative proposals for financing the development of the Project. These proposals relate to senior debt and range between US\$50m and US\$70m. The Company's aim is to avoid dilution to existing shareholders, to the greatest extent possible.

Board and management have been responsible for the study, financing and/or development of several mining projects globally. Based on this experience, the Board believes that a debt:equity ratio of 70:30 is potentially achievable for the Project.

For the reasons outlined above, the Board believes that there is a reasonable basis to assume that future funding will be available as and when required. However, investors should note that there is no certainty that the Company will be able to raise the amount of funding required to develop the Project when needed. It is also possible that such funding may only be available on terms that may be dilutive or otherwise affect the value of the Company's shares, or that the Company may pursue other 'value realisation' strategies such as a sale, partial sale or joint venture of the Project (which may reduce the Company's proportionate ownership of the Project).

## Environmental and Permitting

In Ontario, the Ministry of Energy Northern Development and Mines (MENDM) co-ordinates the permitting requirements of mineral development projects from mineral exploration through to mine development, operation, and eventually to plant closure, ensuring adequate time for engagement and meaningful involvement of all the potential stakeholder interests. The Company has been advised by MENDM that the commencement of operations will require permit and licensing approvals that will include:

1. Consultation and Agreements with Indigenous Groups – this is a continuous process and the Company is taking a collaborative and consultative approach. These discussions will increase post the release of the BFS;
2. Permits related to re-establishing the historic surface water taking and mine dewatering – a hydrology study to support the surface water taking application and a hydrogeology study to support the mine dewatering application has been completed;
3. Environmental Compliance Approval (ECA) for any discharges to air or water, with the latter including potentially separate approvals and treatment processes for industrial wastewater and domestic sewage generated from the mine operations. The supporting emission summary and air dispersion model to confirm compliance with regulated air quality criteria is in progress.
4. Land Use Permit (LUP) for project features that are off of patented or leased surface rights. A LUP is currently in place for the existing power line and this will be transferred to the Company post transfer of Project ownership. The required pipeline corridor is currently being designed as part of the BFS and this application will be submitted post the transfer of Project ownership; and



5. The issuance of operational licenses by the MENDM, Ministry of the Environment, Conservation and Parks, and the Ministry of Natural Resources and Forestry. Work is ongoing with field work that is part of the BFS to support the application of operational licenses. Work includes the sampling the water in the tails management facility and the underground workings for treatability testing, biological assessments for significant wildlife habitat, inspecting the mine openings including capturing video footage, dam inspections, geochemical characterization of the rock to be mined, supplemental geotechnical investigations and ground water monitoring well installation, supplemental surface water sampling and ground water sampling.

The Company continues to progress the Project approval process to meet all regulatory requirements and importantly to meet the guidelines of the Equator Principles. The key areas of environmental and social assessment, stakeholder engagement, and applicable environmental and social standards have been guiding principles in the BFS and work completed at the Project. Superior Lake's operational readiness and Project execution strategies will incorporate environmental and social management systems, grievance mechanisms, independent reviews, independent monitoring and reporting, and transparency.

The Project approval process required for the redevelopment and commencement of production is summarised below. The Company is required to submit documentation to the relevant ministry for review and approval. Once the application is submitted, the ministry assesses the application through a defined process that includes a technical review and discharging the Crown's duty to consult indigenous communities.

### First Nations

The Company has commenced the engagement with key indigenous stakeholders in the region of the Project. Working with these key groups during the Project execution phase is a key part of the permitting process. As a part of the consultation process, Superior Lake has adopted a proactive approach to engage, consult and collaborate with the First Nations on the benefits of the Project, which include:

- Employing indigenous people with the right skills and knowledge;
- Training indigenous people to obtain required skills and knowledge;
- Intending to enter into business arrangements with indigenous companies or ventures that have the capacity to competitively perform required services; and
- Proactively managing and monitoring the social and environmental impacts of the Project.

### Next Steps and Implementation

The high-level implementation schedule for the Project indicates a construction period of 15 months and assumes a start date (i.e. pending a decision to mine) of 1 April 2020. This start date is subject to completion of offtake agreements and conclusion of the financing arrangements. As a lag exists between the completion of this BFS and the decision to mine, an opportunity exists to undertake certain critical tasks that impact the execution schedule. These tasks, which can be undertaken as part of a FEED (front end engineering and design) program for relatively low cost, have the potential to reduce the execution schedule.

### Future Work Program

The future work program for the Company includes the following activities:

- Finalising off-take agreements with the selected parties
- Securing debt financing
- Value engineering to look at cost reduction opportunities

- Delivering an Optimisation Study that incorporates the above
- Completing the environmental licensing (including the Closure Plan) process
- Securing the permits required for commencement of construction
- Finalising agreements with First Nations groups
- The opportunity to undertake some FEED on critical items to reduce the construction period will also be considered

## About the Company

### Superior Lake Resources Limited

Superior Lake Resources Limited is focused on the redevelopment of the Superior Lake Zinc Project in North Western Ontario, Canada. The Project is a high-grade zinc deposit with a JORC resource of 2.35 Mt at 17.7% Zn, 0.9% Cu, 0.38 g/t Au and 34 g/t Ag and a Probable Ore Reserve of 1.96Mt at 13.9% Zn, 0.6%Cu, 0.2g/t Au and 26.2g/t Ag.

Superior Lake Mineral Resource at 3% Zn cut-off grade					
Classification	Tonnage Mt	Zn%	Cu%	Au g/t	Ag g/t
Indicated	2.07	18.0	0.9	0.38	34
Inferred	0.28	16.2	1.0	0.31	37
<b>Total</b>	<b>2.35</b>	<b>17.7</b>	<b>0.9</b>	<b>0.38</b>	<b>34</b>

Superior Lake Ore Reserve					
Classification	Tonnage Mt	Zn%	Cu%	Au g/t	Ag g/t
Probable	1.96	13.9	0.6	0.2	26.2
<b>Total</b>	<b>1.96</b>	<b>13.9</b>	<b>0.6</b>	<b>0.2</b>	<b>26.2</b>

To learn more about the Company, please visit [www.superiorlake.com.au](http://www.superiorlake.com.au), or contact:

David Woodall      Chief Executive Officer      +61 8 6117 0479





## Appendix 1 – Material Assumptions

Material assumptions used in estimation of the production target and associated financial information are set out in the following table.

Assumption	Comment
Study Status	<p>The Bankable Feasibility Study referred to in this announcement is based on Probable Ore Reserve and minor amounts of Inferred Resources. The Probable Ore Reserve is based on Indicated material only, which makes up 93% of the total milled tonnage (7% Inferred material) and 90% of the total contained zinc metal (10% Inferred).</p> <p>There is a low level of geological confidence associated with Inferred Mineral Resources and there is no certainty that further exploration work will result in the conversion of Inferred Mineral Resources to Indicated or Measured Mineral Resources or that the production targets reported in this announcement will be realised.</p> <p>The Study has been prepared with accuracy of +/- 15%. There is no certainty that the conclusions of the Study will be realised.</p>
Ore Reserves and Mineral Resources underpinning the study	<p>The Ore Reserve estimate that underpins the Study was released to ASX on 28<sup>th</sup> August 2019 and was prepared by a competent person in accordance with the JORC Code 2012.</p> <p>The Mineral Resource estimate that underpins the Study was released to ASX on 7<sup>th</sup> March 2019 and was prepared by a competent person in accordance with the JORC Code 2012.</p>
Mining factors or assumptions	<p>Mining is proposed to be completed by conventional underground mining practices adopting the Longhole Open Stopping (LHOS) method using cemented paste fill. The mining parameters used are:</p> <ul style="list-style-type: none"> <li>– Minimum Mining Width, 1m</li> <li>– Fixed HW dilution, 0.5m</li> <li>– Fixed FW dilution, 0.5m</li> <li>– Minimum FW angle 50, degrees</li> <li>– Mining dilution factors, incorporating 0.5m FW &amp; HW dilution skins and paste dilution from adjacent stopes where applicable</li> </ul> <p>All development headings are proposed to be developed using twin boom Jumbos which will also be used for ground support installation. The mine will be accessed by a new decline developed from the surface, adjacent to the historical workings of Zenmac, across to the upper resources of the Pick, and then a 1 in 7 hangingwall ramp is developed to access the resource at Pick. Material from Pick Lake is proposed to be hauled using trucks to surface via the decline.</p>
Metallurgical factors or assumptions	<p>Recovery numbers were based on 11 years of historical operations at Winston Lake and testwork undertaken by the Company at SGS Canada on core samples collected from the 2018 drill program. Based on the reviews of the metallurgical reports and the original system design descriptions, Primero have developed a slightly revised flowsheet, taking advantage of newer equipment available. Metallurgical recoveries used in the Study are summarised below:</p>

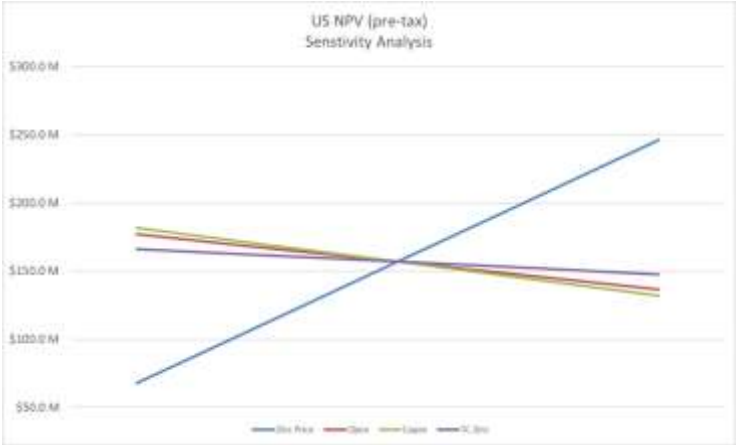


Assumption	Comment										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Metal</th> <th style="text-align: right;">Average Recovery</th> </tr> </thead> <tbody> <tr> <td>Zinc</td> <td style="text-align: right;">96%</td> </tr> <tr> <td>Copper</td> <td style="text-align: right;">77%</td> </tr> <tr> <td>Gold (reporting to Cu conc)</td> <td style="text-align: right;">32%</td> </tr> <tr> <td>Silver (reporting to Cu conc)</td> <td style="text-align: right;">36%</td> </tr> </tbody> </table>	Metal	Average Recovery	Zinc	96%	Copper	77%	Gold (reporting to Cu conc)	32%	Silver (reporting to Cu conc)	36%
Metal	Average Recovery										
Zinc	96%										
Copper	77%										
Gold (reporting to Cu conc)	32%										
Silver (reporting to Cu conc)	36%										
Environmental	<p>The Company has commenced the permitting process required in Ontario for development of a mineral project. The permitting of the Superior Lake Project has the benefit of the Winston Lake Mine having permits in place inclusive of an environmental certificate of approval (ECA) and a Closure Plan, both of which will revert to Superior once the option agreement with First Quantum is exercised.</p> <p>Superior Lake is progressing the environmental and permitting requirements with completion expected by Q2 2020. To date, all environmental permits and approvals are in good standing.</p>										
Infrastructure	<p>The Company, Nordmin Engineering and Wood Canada have reviewed the infrastructure on site. The Superior Lake Project has an all-weather road, a live 115kV powerline, a tailings dam facility, freshwater dam, two vertical shafts and underground development adjacent to the resource proposed to be mined.</p>										
Capital costs	<p>The capital estimate is considered to have an accuracy of -10/+15%. A ~9.5% contingency has been added to the total of the direct and indirect costs for the estimate summary to account for any potential shortcoming in the data and information that was collected during the execution of this Study.</p> <p>All equipment has been assumed to be purchased new, as OEM systems, rather than used. As such, opportunities may exist to reduce capital by sourcing reconditioned plant and equipment. The cost estimates have been developed using past project experience, the engineer's project cost database and manufacture/supplier budget pricing for major plant and equipment.</p>										
Operating costs	<p>Operating costs include all costs associated with mining, processing, general site administration, and treatment. These costs were calculated from first principles and where applicable referenced against similar size and types operations as a check. Mining costs were estimated at US\$ 53.3/t, plant and admin labour costs of US\$5.5M per annum, processing at US\$14.2/t, and G&amp;A costs at US\$2.8M per annum. The treatment charge was US\$130/t concentrate for zinc and USD\$95/t concentrate for copper. Concentrate transport was USD\$40/t.</p>										
Revenue factors	<p>Revenue analysis used consensus long term zinc price of USD\$2,690/t, USD\$6600 for copper, USD\$1400/oz gold and USD\$ 18/oz silver. Payables for the zinc were 90%, copper 96%, gold 94%, and silver 90%.</p>										
Schedule and Project timing	<p>The next stage of Project development commences with the Optimization Study. This is followed by the construction phase, which is forecast to commence in Q2 2020, with first ore occurring in Q3 2021. Commercial production is estimated to occur in Q4 2022, following an 18 month ramp up.</p>										
Market assessment	<p>The concentrate deficit as a result of mine closures and production cuts in 2015 and 2016 along with the increasingly stringent</p>										



Assumption	Comment
	<p>environmental oversight in China, is forecast to be balanced by 2020. This recovery is reliant to four major projects (Dugald River, New Century, Gamsberg, and Glencore's Australian assets) that are forecast to ramp up over the next 1 to 2 years. The underlying metal prices reflect the supply and demand conditions and the market sentiment. Superior has used consensus price forecasts when estimating revenue generated by the Superior Lake Project.</p>
Funding	<p>To achieve the range of outcomes indicated in the Study, funding in the order of US\$100 million will likely be required for capital works, pre-production capital costs, contingency and working capital. It is anticipated that the finance will be sourced from a combination of equity and debt instruments from existing shareholders, new equity investment and debt providers from Australia and overseas.</p> <p>The Board believes that there is a reasonable basis to assume that funding will be available to finance the pre-production activities necessary to commence production on the following basis:</p> <ul style="list-style-type: none"> <li>- the Board and executive team have a strong financing track record in developing resource projects;</li> <li>- the Company believes this Study demonstrates the Superior Lake Project's strong potential to deliver a favourable economic return;</li> <li>- the Company has a proven ability to attract new capital. It successfully completed a placement of 142,857,143 new ordinary shares to raise \$5 million at \$0.035 per share in August 2018 ("<b>August 2018 Placement</b>"). The Company used the funds from the August 2018 Placement to complete the Bankable Feasibility Study and for general working capital. In July 2019, the Company successfully completed the placement of 216,363,122 fully paid ordinary shares at an issue price of \$0.0175 per share to raise A\$3.8 million (before costs) ("<b>July 2019 Placement</b>").</li> <li>- pursuant to a financing process being managed by Orimco Resource Investment Advisers ("<b>Orimco</b>"), the Company has received multiple non-binding indicative proposals for financing the development of the Project. These proposals relate to senior debt and range between US\$50m and US\$70m;</li> <li>- Tribeca also acted as cornerstone investor subscribing for the Placement and is supportive of the Company's strategy. As at the date of this announcement, Tribeca holds a 6.72% interest in the Company's issued capital;</li> <li>- the Company is confident its brownfield exploration program will add additional resources beyond what is currently included in the Restart Study;</li> <li>- the positive financial metrics of the Superior Lake Project and the underlying demand growth for zinc; and</li> <li>- other companies at a similar stage in development have been able to raise similar amounts of capital in recent capital raisings.</li> </ul> <p>The Board believes that there is a reasonable basis to assume funding will be available to construct the operation once the Bankable feasibility is completed.</p>
Economic parameters	<p>The Study has been completed with a -10%/+15% accuracy. A discount rate of 8% has been used for financial modelling. This number was selected as a generic cost of capital and is considered as a</p>



Assumption	Comment
	<p>prudent and suitable discount rate for project funding and economic forecasts in Canada for a project such as the Superior lake Zinc Project. The model has been run as a life of mine model and includes sustaining capital costs and closure costs. The Study outcome was tested for key financial inputs including: price, operating costs, capital costs and treatment charges. All these inputs were tested for variations of +/- 10% and +/- 20%, with the outcomes shown below:</p>  <p>The graph shows four lines representing different input variables: Price (blue), Costs (red), Capital (green), and O&amp;M (purple). The Price line shows a strong positive correlation, increasing from approximately \$50M to \$250M. The other three lines (Costs, Capital, O&amp;M) show a negative correlation, decreasing from approximately \$180M to \$100M.</p>
Exchange rate	Estimates in this announcement are presented in USD unless otherwise stated.
Community & Social Responsibility	<p>In Ontario the permitting required for a mineral development project generally occurs in three phases, Development, Operations, and Closure, Reclamation and Monitoring. The permitting of the Project has the benefit of the Winston Lake Mine having permits in place inclusive of an environmental certificate of approval (ECA) and a Closure Plan, both of which will revert to Superior once the option agreement with First Quantum is exercised.</p> <p>Any mineral development project must include consultation with Aboriginal communities, the general public and private interests (e.g. tourism, environmental organizations, local taxpayer's organization, etc.). Superior Lake has commenced the consultation process in conjunction with the Ministry of Energy, Northern Development and Mines.</p>
Other	Other risks to the Project relate to metal prices, social licence, and other similar risks of resource projects.
Audit and Reviews	The studies were internally reviewed by Superior Lake with no material issues identified