

BLACKSTONE MINERALS LIMITED

Equity Research

6th November 2020

SPECULATIVE BUY

Price Target **\$0.95**
Share Price **\$0.38**

52-Week Range \$0.079 - \$0.540
Market Capitalisation \$121.7m
Shares Outstanding 320.3m
Advisor Options (10 , Mar 2021) 10.0m
Unlisted Options (20 , Jun 2022) 1.0m
Performance Options 6.15m
Cash (as at 30th Sep 2020) \$22.7m
Enterprise Value \$99.0m

Major Shareholders:

Board & Management 14%
Deustche Balaton 13%
Ecopro 13%
Fidelity 6%
Top 20 shareholders 60%

Board

Hamish Halliday Chairman
Scott Williamson Managing Director
Andrew Radonjic Non-Executive Director
Hoirim Jung Non-Executive Director
Steve Parsons Non-Executive Director

Management

Jamie Byrde Company Secretary
Dr Stuart Owen Exploration Manager
Steve Ennor Project Manager
Patrick Chang Corp. Development Officer

Research Analyst: J-Francois Bertincourt

Scoping Study shows Tremendous Value-Add from Downstream Processing

Race to NCM precursor: while six drill rigs are still currently spinning, Blackstone Minerals Limited released a stepping stone scoping study focused on the Ban Phuc disseminated sulphide mineralisation recently discovered at the Ta Khoa project in Vietnam, with an vertically integrated project including the refining of nickel-cobalt concentrate into a NCM precursor to satisfy the demand of its strategic partner Ecopro and potentially other battery manufacturers.

Mineral Resource: Indicated 44.3Mt @ 0.52% Ni for 229,000t Ni and Inferred of 14.3Mt @ 0.35% Ni for 50,000t Ni. The maiden mineral resource is at the upper end of our exploration target defined 10 months ago: 20-50 Mt @ 0.5-0.6% Ni for 100,000 to 300,000 t Ni. We expect this to increase by 20-40% as two rigs continue to drill Ban Phuc. Furthermore, a maiden mineral resource can be expected for Ban Chang within the next six months.

Company Strategy: we see BSX medium-term strategy as follows:

1. Increase the mineral resource at the Ban Phuc disseminated sulphide deposit in preparation for the Pre-Feasibility Study to support the development of a new 4 or 6 Mtpa plant
2. Drill test and develop massive and semi-massive sulphide veins to justify an early restart of the existing plant (best suited for high grade mineralisation). Such restart will bring cash flow to assist in the financing of the downstream processing (step 1) and the larger concentrator (step 2)

The strategy has been highly successful so far and BSX is intensifying the exploration programmes on various prospects thanks to its own geophysical team and six drill rigs including four owed by BSX. This report is focused on the results of the scoping study the Ta Khoa project.

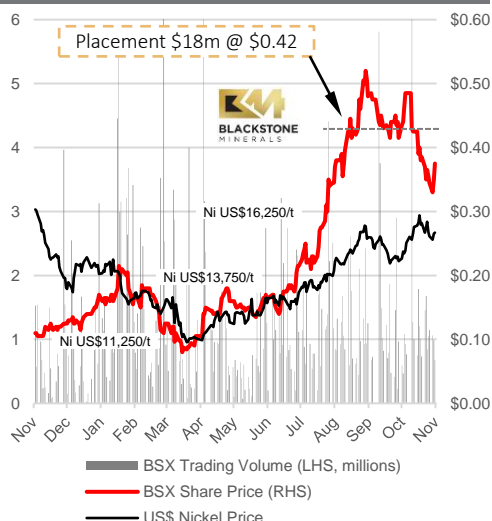
Multi-Levers Value-Add from Downstream Processing: the production of NCM precursor adds significant value far beyond the refining step as the payability typically (70-80%) affecting the sale of nickel concentrates becomes irrelevant and BSX eliminates the Vietnamese tariffs applied to the export of nickel concentrates.

Robust Project preparing for the next Ni price spike: the table below summarises the results of financial modelling for two operations developed in parallel, under different nickel price scenarios.

Nickel Price	US\$6/lb	US\$7/lb	\$7-\$8-\$6	US\$8/lb
Nickel price	US\$13,228/t	US\$15,432/t	-	US\$17,637/t
BAN PHUC DSS 4 mtpa DEVELOPMENT (from 2023) Capex US\$314m				
NPV _{8%} pre tax	US\$129m	US\$391m	US\$463m	US\$653m
IRR pre tax	18%	33%	43%	47%
NPV _{8%} post tax	A\$110m	A\$438m	A\$549m	A\$766m
IRR post tax	14%	30%	40%	43%
Risk factor	20%	20%	20%	20%
Risked NPV	A\$22m	A\$88m	A\$110m	A\$153m
RESTART OF BAN PHUC 450 ktpa CONCENTRATOR (from 2022) Capex US\$30m				
NPV _{10%} post tax	A\$154m	A\$205m	A\$239m	A\$256m
IRR post tax	124%	172%	187%	219%
Risk factor	70%	70%	70%	70%
Risked NPV	A\$108m	A\$144m	A\$167m	A\$180m

Source: Terra Studio estimates. US\$/A\$ exchange rate of 0.70

BSX Valuation: Our speculative value currently stands at A\$312 million or \$0.95 per share. Cashed up, BSX has the opportunity to increase further its exploration and development momentum, discovering new MSV sulphide deposits such as Ban Chang. Those deposits can be quickly developed with ore treated at the existing 450 ktpa concentrator generating cash flows to assist in the financing of the value-add downstream processing and a second 4 Mtpa or 6 Mtpa concentrator.



Blackstone Minerals Ltd (ASX: BSX) is a mineral exploration and development company, which acquired in May 2019 a 90% interest in the Ta Khoa nickel project in Vietnam. The Ta Khoa district scale project includes the Ban Phuc nickel sulphide mine, with a 450,000 tpa concentrator and associated infrastructure as well as 25 prospects for massive and disseminated nickel sulphide mineralisation.

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1. BSX Valuation

Ta Khoa NPV Valuation

We have modeled the redevelopment of the Ta Khoa project with two operations being developed in parallel:

Early Restart Scenario with MSV from 2022:

- Underground mine at Ban Chang
- Existing concentrator restarting at capacity (450,000 tpa), running for 4 years

Ban Phuc DSS Development (subject of the scoping study) from 2023:

- Mining development with an open pit at Ban Phuc/King Cobra Zone for the DSS mineralisation
- Additional new 4 Mtpa concentrator and refining plants to produce NCM precursor as per BSX scoping study

The assumptions relevant to each operation are detailed in sections 4 and 5 of this report. In terms of nickel prices, the assumptions are as follows:

- US\$6.0/lb flat,
- US\$7.0/lb flat,
- an assumed price boom averaging US\$8.0/lb for 5 years from 2023, then prices getting depressed back to US\$6.0/lb from 2028,
- finally US\$8/lb flat

Early Restart Scenario with MSV Valuation

Table 1.1 below summarises the results of the different scenarios run.

Table 1.1 – Early Restart Scenario with MSV Valuation

Item	Unit	\$6/lb	\$7/lb	7 -> 8 -> 6	\$8/lb
Nickel price	US\$/lb	\$6/lb	\$7/lb	\$7-\$8-\$6	\$8/lb
Nickel price	US\$/t	\$13,228	\$15,432	n/a	\$17,637
NPV _{10%} post tax	A\$m	\$154m	\$205m	\$239m	\$256m
IRR post tax	%	124%	172%	187%	219%
Risk factor	%	70%	70%	70%	70%
Risked NPV	A\$m	\$108m	\$144m	\$167m	\$180m

Source: Terra Studio estimates

Ban Phuc DSS 4 Mtpa Development Valuation

Table 1.2 below summarises the results of the different scenarios run.

Table 1.2 – Ban Phuc DSS 4 Mtpa Development Valuation

Item	Unit	\$6/lb	\$7/lb	7 -> 8 -> 6	\$8/lb
Nickel price	US\$/lb	\$6/lb	\$7/lb	\$7-\$8-\$6	\$8/lb
Nickel price	US\$/t	\$13,228	\$15,432	n/a	\$17,637
NPV _{8%} pre tax	US\$m	\$129m	\$391m	\$463m	\$653m
IRR pre tax	%	18%	33%	43%	47%
NPV _{8%} post tax	A\$m	\$110m	\$438m	\$549m	\$766m
IRR post tax	%	14%	30%	40%	43%
Risk factor	%	20%	20%	20%	20%
Risked NPV	A\$m	\$22m	\$88m	\$110m	\$153m

Source: Terra Studio estimates

Our financial model appears tuned to BSX model according to the results for the pre tax NPV and IRR: US\$653m and 47% vs US\$665m and 45% included in BSX Scoping Study announcement (14th October 2020).

The Ban Phuc DSS project is robust in a low nickel environment and delivers outstanding returns in our preferred nickel price scenario.

BSX Sum of the Parts Valuation

Putting both operations together

Table 1.2 – BSX Sum of the Parts Valuation

Asset	Value Range	Preferred *	Per Share
Ban Chang + Ban Phuc 450,000 tpa re-start	\$108-\$180m	\$150.3m	\$0.45
Ban Phuc 4 Mtpa	\$22m-\$153m	\$99.0m	\$0.30
Ta Khoa exploration upside	\$15-\$70m	\$45.0m	\$0.14
Other projects	\$5-\$10m	\$8.0m	\$0.02
Cash (30 th Sep 2020)		\$27.8m	\$0.08
Options exercised over next 12 months		\$1.0m	\$0.003
Exploration and development study costs		(\$15.0m)	(\$0.05)
Corporate costs		(\$3.6m)	(\$0.01)
Total		\$312.5m	\$0.95

Source: Terra Studio estimates. * includes 90% Ta Khoa project interest.

2. BSX Strategy

Objective

The objective is to produce a high value downstream nickel product for the Li-ion battery manufacturing hub being developed in the port city of Hai Phong , where leading manufacturing companies have existing large-scale electronics manufacturing facilities.

The Board and Management of Blackstone Minerals Ltd believe the Ta Khoa district and Ban Phuc mine represent a rare opportunity to invest in a premier, infrastructure advantaged, district scale, Nickel PGE (Cu Co) sulphide project, with a downstream nickel sulfate value-add opportunity, located in an emerging hub for Electric Vehicle Lithium-ion battery manufacturing.

Strategy

With the initial drilling campaign, BSX focused on accumulating nickel units, targeting disseminated sulphides (DSS) with lower grades but building mineral resources tonnes and nickel content to support consistent production over a long mine life as requested by Ecopro and the prospective downstream off-takers.

With the maiden mineral resource and associated mining inventory, the Ban Phuc DSS deposit supports a mining and refining operation over eight years. With the current additional drilling taking place at Ban Phuc the mine life should well be in excess of 10 years based on this deposit alone.

In parallel, Blackstone is targeting massive sulphide (MSV) prospects analogous to the previously mined Ban Phuc, where previous owners successfully mined 975kt of high grade ore at average grades of 2.4% Ni and 1.0% Cu from an average vein width of 1.3m for 3.5 years between 2013 and 2016, producing 20,700 t Ni, 10,100 t Cu and 670 t Co.

At Ban Chang, the initial drilling results indicate MSV mineralisation over a 1.2 km of strike. If this is confirmed by further drilling, the Ban Chang deposit could be larger than the Ban Phuc MSV deposit mined by the previous owners, which had a strike length of 730m and where 975,000 tonnes of high grade ore was mined at average grades of 2.4% Ni and 1.0% Cu from an average vein width of 1.3m for 3.5 years between 2013 and 2016.

Furthermore and similarly to the King Cobra Zone at Ban Phuc, the Ban Chang prospect appears to host a disseminated sulphide zone, the Viper Discovery Zone.

At Ta Cuong, historic drill holes (previously unassayed) returned significant results and further drilling is currently underway after electro-magnetic (EM) plates were defined.

3. Ban Phuc DSS Benchmarking

Mineral Resource

The maiden mineral resource for the Ban Phuc disseminated sulphide deposit is at the upper end of the exploration target published 10 months ago: 20-50 Mt @ 0.5-0.6% Ni for a nickel metal content ranging from 100,000 to 300,000 tonnes. And the mineral resource will grow further with the drilling continuing to take place currently at this deposit (two drill rigs).

Table 3.1 - Ban Phuc DSS maiden mineral resource (Oct 2020)

Category	Tonnes	Ni grade	Ni metal
Indicated	44.3 Mt	0.52%	229,000 t
Inferred	14.3 Mt	0.35%	50,000 t
Total	58.6 Mt	0.48%	279,000 t

Source: BSX. Please refer to ASX announcement for the details of other metals: Cu, Co & PGE

Figure 3.1 places the Ban Phuc DSS mineral resource among its peer projects globally. The mineral resource of the Mt Keith mine has been added for comparison purposes.

Ban Phuc compares well in terms of Ni grade among the large disseminated mineral resources defined for projects around the world.

Figure 3.1 – Benchmarking of the Ban Phuc DSS maiden mineral resource

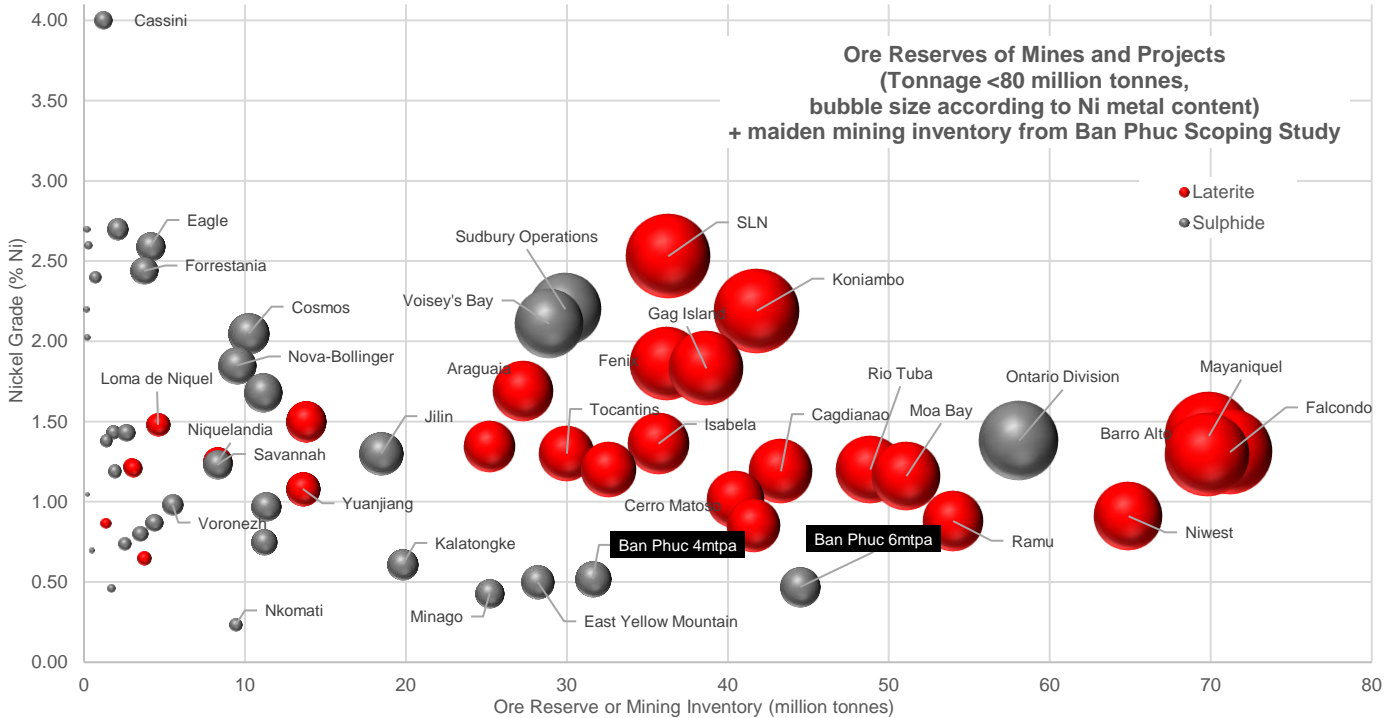


Source: S&P Global, Terra Studio

Mining Inventory

The preliminary Ban Phuc mining inventory as defined by the scoping study.

Figure 3.2 – Benchmarking of the Ban Phuc DSS mining inventory



Source: S&P Global, Terra Studio

Please note while the Ban Phuc nickel grade appears low compared to lateritic projects. The capex and in most cases the opex required to developed and operated the laterite projects is an order of magnitude bigger than the ones required for sulphide projects (see next section).

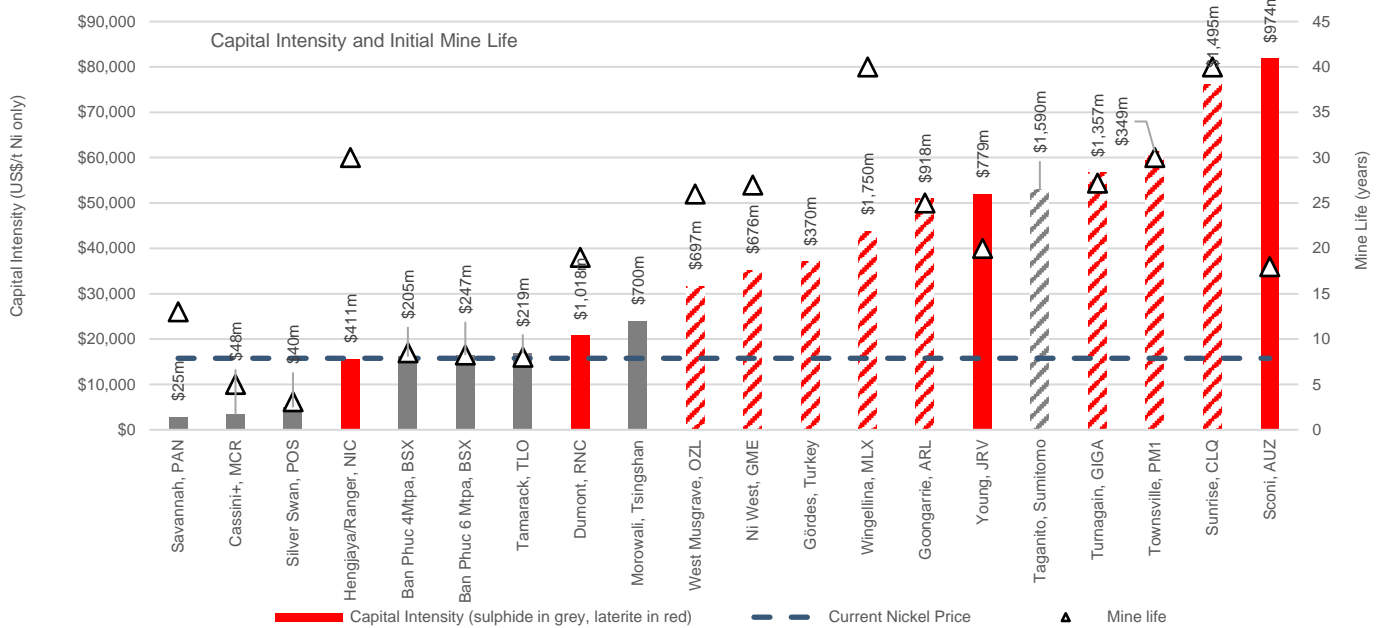
Furthermore, as BSX aims to develop an integrated project with value-add downstream processing in collaboration with Ecopro, the payability (i.e. a discount applied by smelters to treat nickel concentrates) of the nickel in concentrate becomes irrelevant.

Capital Intensity and Mine Life

In terms of capital intensity, sulphide projects typically present a lower capital intensity than their lateritic counterparts. The Ban Phuc DSS project is no exception. Note that the capex for the downstream refining has been substracted for comparison purposes with other projects.

The Ban Phuc mine life is modest as it relates to the maiden mineral resource. It will grow in the short term with mineral resource updates for the Ban Phuc DSS deposit and in the long term with additional discoveries highly likely in the Ta Khoa district.

Figure 3.3 – Capital intensity and initial mine life of selected nickel projects



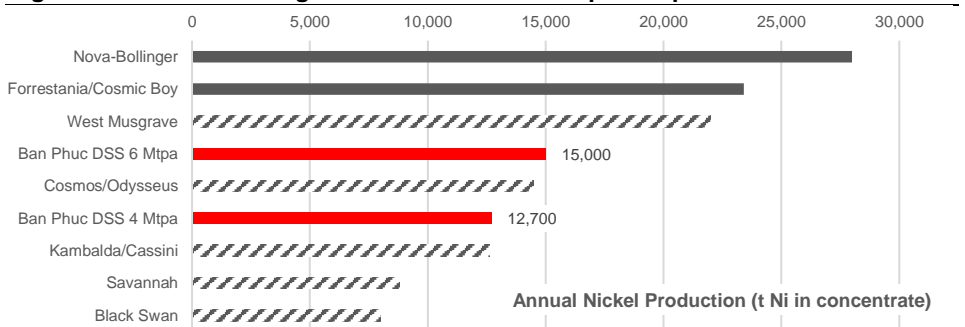
Source: company announcements, Terra Studio. AUD figures converted to USD using 0.70 exchange rate

In parallel to the Ban Phuc DSS project, and subject to defining some mining inventory at Ban Chang (next 3-6 months) and Ta Cuong (next 6-12 months), BSX as the opportunity to restart the existing 450,000 tpa concentrator. For such operation the capital required and capital intensity will be quite low in the order of the ones observed for Cassini (MCR), Savannah (PAN) and Silver Swan (POS), where treatment plants are in place, on care and maintenance waiting for new feed (except for MCR which toll treat its ore through BHP’s Kambalda concentrator).

Future Production

Figure 3.4 displays the expected nickel concentrate production from Ban Phuc under the two throughput scenarios proposed: 4 and 6 Mtpa.

Figure 3.4 – Benchmarking of the Ban Phuc DSS expected production



Source: company announcements, Terra Studio.
Note: FY2021 guidance for Nova, FY2020 production for Forrestania

The chart above is based on production nickel metal in concentrates. If payable metal was considered, the production of all peers should be discounted by 20-30% while the Ban Phuc production should remain the same. Furthermore the value-add brought by the downstream processing can be interpreted as an additional boost in payability.

4. Ban Phuc DSS Project

Assumptions

We have selected the 4Mtpa development scenario with costs assumed to be at the mid-point of the ranges provided by BSX.

In addition, sustaining capital is assumed to be 5% of the operating costs year on year.

Mining Licence, Environmental Fee and Royalties

Mining operations are subject to various fees: mining licence fee, environmental protection fee and some royalty based on the ore metal content. For the sake of simplification, we assumed the combined value of those fees to be ~US\$900/t Ni contained.

Corporate Tax

We have included the Vietnamese corporate tax rate of 20% in the model to derive post-tax NPV and IRR, with a 3-year tax holiday.

5. MSV Development Scenario

Mineral Resource

Considering the recent drilling success at Ban Chang MSV, a mineral resource similar to the one delineated at Ban Phuc pre-production is likely.

Table 5.1 - Mineral Resource – Ban Phuc MSV Pre-Production

Category	Tonnes	% Ni	% Cu	% Co	Nickel	Copper	Cobalt
Measured	0.73 Mt	2.78	1.16	0.07	20,000 t	8,000 t	
Indicated	0.96 Mt	2.60	1.22	0.06	25,000 t	12,000 t	1,000 t
Measured + Indicated	1.69 Mt	2.68	1.19	0.06	45,000 t	20,000 t	1,000t
Inferred	0.17 Mt	1.94	0.80	0.03	3,000 t	1,000 t	0 t

Source: Asian Mineral Resources Ltd

Mining Inventory

We assumed a mining inventory equivalent to the ore reserve estimated for Ban Phuc pre-production.

Table 5.2 – Ore Reserve – Ban Phuc Deposit Pre-Production

Category	Tonnes	% Ni	% Cu	%Co
Proven	0.71 Mt	2.40	1.0	0.06
Probable	0.90 Mt	2.10	1.0	0.04
Total	1.6 Mt	2.20	1.0	0.05

Source: Asian Mineral Resources Ltd

Mining Scenario

The MSV mineralisation will be mined underground. We assumed a capital expenditure of US\$12 million to setup an underground mine at Ban Chang. The initial capital cost to setup the Ban Phuc mine was estimated at US\$6.2 million in 2013.

Throughput

The throughput is assumed as per the existing concentrator, i.e. 450,000 tpa. The ore reserve should be mined and processed in about 3.5 years.

Metallurgical Recovery

We assumed a metallurgical recovery of 89%.

For the sake of simplification and considering the level of approximation of the financial modelling, the other metals, cobalt, copper and PGE are ignored in the model. Instead an overall increase of the cash flows by 10% has been assumed to take into consideration the contribution of those metals.

Payability

A concentrate grade of 10% Ni was assumed in line with the previous operation, with a payability of 70%. We understand that the nickel concentrate is destined to be refined into NCM precursor, but at this time, and without details of the implementation of the Blackstone-Ecopro alliance, we have selected this conservative assumption.

Capital Costs

For the existing plant restart, we assumed an initial capital cost of US\$18 million, plus US\$12 million for the underground development at Ban Chang. The sustaining capital is assumed at about 5% of the operating costs year on year.

Operating Costs

The operating costs are summarised in Table 4.3 below.

Table 4.3 – Operating Costs Assumptions

Cost	Unit	Value	Notes
Underground mining cost	US\$/t mined	49.0	Actual from Ban Phuc
Processing cost	US\$/t processed	27.0	Actual from Ban Phuc
Other cost (G&A, royalties, etc)	US\$/t processed	10.0	Actual from Ban Phuc

Source: BSX, Terra Studio estimates

Tariffs applicable to nickel concentrate sales have not been considered in view of the down stream processing. Licence and enviromental fees as well as royalties are ignored.

Corporate Tax

Vietnam applies a corporate tax rate of 20%. We assumed that the future operation should also benefit from a 2-year tax holiday from re-start.

6. Exploration Upside

Considerable potential exists in the district for large-tonnage, lower-grade deposits of disseminated sulphides within ultramafic intrusions, similar to the DSS style mineralisation. Regional exploration in the Ta Khoa corridor has identified an extensive system of mafic-ultramafic intrusives, a remarkable number of which have associated Ni-Cu massive or disseminated sulphide mineralisation.

In addition, the identified prospects and the recent exploration successes tend to confirm that MSV mineralisation is scattered around the Ta Khoa Project and can deliver low tonnage, higher-grade nickel sulphide deposits.

For the sake of brevity, please refer to the research report dated 20th Sep 2020 available here:

<https://www.terrastudio.biz/blog/post/6946/district-scale-project-brings-multiple-discoveries-and-high-prospectivity/>

for extensive details of the numerous prospects, part of the Ta Khoa project.

We remain confident that the Ta Khoa project will deliver (subject to exploration and drilling) multiple deposits either disseminated or massive sulphides for years and decades to come.

7. Investment Risks

BSX is exposed to a number of risks including:

- Geological risk: the actual characteristics of an ore deposit may differ significantly from initial interpretations.
- Resource risk: all resource estimates are expressions of judgement based on knowledge, experience and industry practice. Estimates, which were valid when originally calculated may alter significantly when new information or techniques become available. In addition, by their very nature, resource estimates are imprecise and depend to some extent on interpretations, which may prove to be inaccurate.
- Commodity price risk: the revenues BSX will derive mainly through the sale of nickel concentrate or nickel sulphate (with some by-product credits from copper, cobalt and PGE) exposing the potential income to metal price risk. The price of nickel and other metals fluctuate and are affected by many factors beyond the control of BSX. Such factors include supply and demand fluctuations, technological advancements and macro-economic factors.
- Exchange Rate risk: The revenue BSX derives from the sale of metal products exposes the potential income to exchange rate risk. International prices of gold and silver as well most of the costs base are denominated in United States dollars, whereas the financial reporting currency of BSX is the Australian dollar, exposing the company to the fluctuations and volatility of the rate of exchange between the USD and the AUD as determined by international markets.
- Mining risk: A reduction in mine production would result in reduced revenue.
- Processing risks: A reduction in plant throughput would result in reduced revenue. In all processing plants, some metal is lost rather than reporting to the valuable product. If the recovery of metal is less than forecast, then revenue will be reduced.
- Operational cost risk: an increase in operating costs will reduce the profitability and free cash generation of the project.

- Management and labour risk: an experienced and skilled management team is essential to the successful development and operation of mining projects.

Terra Studio
Sydney, NSW, Australia
www.terrastudio.biz

REPORT

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The Report reflects the views of the research analyst, Jean-François Bertinourt, authorised representative No 337653, who visited the Company’s operations in Ta Khoa, Vietnam in October 2019.

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